

FINAL
ENVIRONMENTAL ASSESSMENT
FOR THE

SKID STRIP AREA DEVELOPMENT PLAN
AT
CAPE CANAVERAL AIR FORCE STATION
FLORIDA

PREPARED FOR
CAPE CANAVERAL AIR FORCE STATION
AND
45TH SPACE WING
PATRICK AIR FORCE BASE, FLORIDA

JULY 2009

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**FINDING OF NO SIGNIFICANT IMPACT (FONSI)
AND FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)
FOR THE SKID STRIP AREA DEVELOPMENT PLAN
AT CAPE CANAVERAL AIR FORCE STATION
OCTOBER 2009**

An Environmental Assessment (EA) has been prepared to evaluate potential impacts associated with a number of individual projects planned that would accomplish improvements to the Cape Canaveral Air Force Station (CCAFS) Skid Strip. Since the facility no longer operates as a missile skid strip, it is referred to as the "Airfield" throughout the majority of the EA. Several Sustainment, Restoration, and Modernization Construction (SRMC) projects and four Military Construction (MILCON) projects were evaluated for environmental impacts. These projects are designed to update and eliminate certain safety issues and bring the Airfield into compliance with current U.S. Air Force (USAF) instructions. Program initiation is expected in 2009 with ultimate completion in 2020. Because the entire program extends for 11 years and includes construction, some of the projects may require additional environmental analysis in the future.

The proposed action is a combination of four MILCON projects and several interrelated SRMC projects. The MILCON projects include construction of a parking apron on the south side of the existing runway and associated east and west taxiways that will cover approximately 11 acres; construction of a new 65 foot tall control tower; construction of a new Airfield Manager (AM) Operations Building that would adjoin the new tower; and construction of a new Airfield perimeter fence. Each of these elements of the proposed action is further described in Section 2 of the EA. The MILCON projects will result in the removal of approximately 37 acres of vegetation/habitat.

The SRMC projects consist of the following: clear trees located inside the airfield imaginary clearance surfaces; re-route two ditches; demolish the old tower, airfield operations center and parking apron; relocate gates and bollards; install a rotating beacon; lower or relocate area warning lights; install foundation for a mobile aircraft arresting unit; relocate controlled area signs; grade and sod the lateral clear zone; install paved overruns and correct approach lighting; install apron shoulders; and install concrete runway ends. The SRMC projects will result in the loss of approximately 373 acres of vegetation/habitat.

Although one alternative was identified that would reduce the number of airfield waivers by completion of the SRMC projects, it was eliminated from further discussion because it did not eliminate the hazards to flight safety and did not meet all objectives listed in Sections 1 and 2 of the EA. Therefore, the no action alternative was the only alternative to the proposed action that was identified.

In accordance with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations and 32 Code of Federal Regulations 989, Air Force Environmental Impact Analysis Process, the EA, hereby incorporated by referenced, evaluated the potential environmental impacts associated with the proposed implementation of the Skid Strip Area Development Plan at CCAFS.

ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION

No significant environmental impacts to the natural or human environment were identified from implementing the proposed action at the Skid Strip that would require the completion of an Environmental Impact Statement (EIS). As part of the EA, the following resource areas were recognized as not being impacted by the proposed action or the no action alternative and were therefore eliminated from further review consideration: land use/visual resources, noise, air quality, hazardous waste/hazardous materials, geology and soils, transportation, health and safety, and socioeconomic. Less than significant impacts for the individual resource areas are summarized below.

Biological Resources

Several threatened and endangered (T&E) species, as well as birds protected under the Migratory Bird Treaty Act, were identified that could be impacted by the proposed action. Upon completion of formal consultation under the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) determined that the proposed action may affect but is not likely to adversely affect the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles. Further, the USFWS determined that the proposed action may affect and is likely to adversely affect the Florida Scrub-jay, Southeastern Beach Mouse, and the Eastern Indigo Snake, but that their continued existence is not likely to be jeopardized if the Air Force employs USFWS mitigation measures." The USFWS has issued an Incidental Take Statement for each of those three species, along with requiring the Air Force to undertake mitigation measures for each species described below. As a result, impact to biological resources is not expected to be significant.

Florida Scrub-jays

The overall impact to T&E species is the result of clearing approximately 411 acres of vegetation that provides habitat to listed species. The federally threatened Florida Scrub-jay occupies approximately 20 of the 411 acres that will be destroyed and, therefore, the USFWS anticipated there would be a "take" of all 12 jays located within the 20 acres. Since the remaining acreage is considered potential jay habitat, compensation is required for the entire acreage. Impacts to Scrub-jays would be minimized by restoring 1157.48 acres of potential scrub-jay habitat at CCAFS over a nine-year period. For each phase of clearing around the airfield, there would be a corresponding project to restore habitat. In addition to this compensation, the Air Force shall also comply with other USFWS requirements, such as avoiding construction and

clearing activities in scrub-jay occupied areas during nesting season, conducting Scrub-jay monitoring, and providing reports, among other actions.

Southeastern Beach Mice

The USFWS anticipated a "take" of all southeastern beach mice as a result of the clearing of 411 acres described above, but the USFWS could not quantify the number of mice because of their burrowing habits and elusive nature. However, the impact to the mice would likewise be minimized, as the proposed 1157.48-acre habitat restoration for the Scrub-jay is expected to be beneficial to southeastern beach mice as well. Based on a three-year study recently completed for CCAFS, beach mice benefit from the same land management activities being conducted for Scrub-jays, and the beach mice population is expanding into inland locations. Therefore, the potential exists to create an additional 1,100+ acres of habitat for beach mice. Based on observations by Air Force biologists of small mammal burrows around the current airfield clear zone, the expansion of that zone has the potential to provide additional habitat. The Air Force shall comply with USFWS handling procedures for dead mice found during construction and clearing activities.

Eastern Indigo Snake

The USFWS also anticipated a take of an undetermined number of eastern indigo snakes due to the loss of 411 acres of habitat. The proposed action's impact on the snakes would be minimized by the proposed 1157.48-acre habitat restoration and by implementing standard protection measures, a snake protection and education plan, and monitoring activities, among other USFWS-imposed requirements.

Sea Turtles

Although the proposed clearing and construction of new facilities would not impact the nesting beach, exterior lighting proposed for the new facilities has the potential to be visible from the beach. Disorientation of adult or hatchling sea turtles could result in an indirect take on the adjacent beach. To minimize the impacts to sea turtles from new facility lighting, all exterior lighting proposed for this project will be in accordance with the 45 SW Instruction 32-7001, *Exterior Lighting Management* dated 25 January 2008. Additionally, a Light Management Plan will be required for the new facilities. This Plan would be forwarded to USFWS for review and approval prior to any facility construction.

Construction activities have the potential to cause harm to gopher tortoises during such project activities as ground clearance, grading, and moving equipment. To avoid gopher tortoise mortalities, pre-construction gopher tortoise surveys and relocation of any tortoises within the boundaries of the work area would be conducted prior to any land disturbance or construction activities. Gopher tortoises would be relocated in accordance with gopher tortoise Relocation Permit WR04151c.

Cultural Resources

The 45 SW cultural resources manager has consulted with the State Historic Preservation Office (SHPO). The Proposed Action will take place within two high areas of archaeological potential (AAP) and in low AAP. Ground-disturbing activities in these areas may affect archaeological sites. To minimize impact on those archaeological sites, the Air Force shall monitor for the existence of archaeological sites and perform reconnaissance level survey in low AAP area and a Phase I survey in high AAP areas. A Phase I survey includes a surface reconnaissance and systematic subsurface testing using the standard operating procedures outlined in the Florida Division of Historical Resources Cultural Resource Management Standards and Operation Manual. The Air Force shall forward copies of the monitoring and survey reports to SHPO. Since the area is so large and the land clearing projects span nine years, archeological surveys and follow-up consultations will be conducted in phases. As a result of these efforts, impact to cultural resources is not expected to be significant.

Water Resources

The Proposed Action is not expected to adversely impact groundwater quality or alter the hydrogeologic characteristics of the surficial aquifer. The Proposed Action requires that all new clear areas be level and absent of any depressions or mounds to comply with airfield safety standards. As a result, the Proposed Action will affect four short man-made ditches, one of which is considered jurisdictional wetlands. Two of the ditches, which are located close to the Skid Strip, will have to be re-routed or have a culvert installed to partially enclose them to comply with safety standards. According to USACE Nationwide Permit regulations and guidance, modification of the jurisdictional ditch (and non-jurisdictional ditch) will not result in significant impact to wetlands because the jurisdictional ditch is of a size that would NOT be considered a major impact if it were filled or modified according to USACE guidance. This activity would require a USACE Nationwide Permit 39, 41, or 43.

Cumulative Impacts

The Proposed Action would result in positive cumulative impacts for the Florida scrub-jay, southeastern beach mice, and eastern indigo snake. Although the Proposed Action would entail the initial loss of 411 acres that serve as habitat for the three species, the Air Force shall expand their habitat by three-fold, which the Air Force anticipates will assist the base's goal of 300 breeding pairs of Scrub-jays on CCAFS. The net impact would be an increase in habitat for not only the Scrub-jays but also for the southeastern mice and eastern indigo snake, which share the same habitat. Potential cumulative impact on cultural resources would be minimized by accomplishing the Phase I survey mentioned above.

Cumulative impacts on sea turtles have the potential to occur due to increased lighting. The new facilities would result in more exterior lighting than is currently present at existing facilities, which could lead to disorientation on the adjacent beach. Adherence to the 45 SW Light Management Plan and Air Force lighting policies will help reduce these impacts. Modifications to the four ditches, part of one which is a jurisdictional wetland would not cause a negative cumulative impact on wetlands.

CONCLUSION

The draft EA and FONSI/FONPA were made available to the affected public for a 30-day public period beginning 31 May 2009. The affected public was notified by advertisement in the *Florida Today* newspaper. The EA and FONSI were made available by placing on file in the local library of Cape Canaveral and the 45 SW Public Affairs Office. No comments were received. The draft final EA and FONSI/FONPA were sent to the State Clearinghouse for review by all state agencies. Their response letter dated July 6, 2009 is included as Appendix E to the final EA.

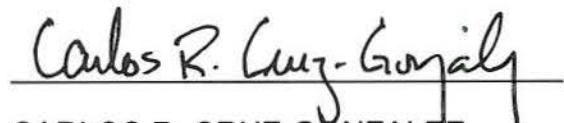
FINDING OF NO PRACTICABLE ALTERNATIVE

Executive Order 11990 directs that each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements. Due to the need for CCAFS to be in compliance with safety regulations and reduce airfield violations, the proposed action would require rerouting the ditches and/or installation of culverts that would result in unavoidable impacts to wetlands. These impacts would be considered minor and conducted in accordance with USACE permit regulations. Minimization of impacts to wetlands is ensured through the Nationwide Permit process. Expansion of the cleared area, which by regulation must be level and without any depressions or mounds, necessarily will extend over parts of two existing drainage ditches and is unavoidable. Because of the nearby location of the ditches in relation to the Skid Strip area, which needs modifications and upgrades to address safety issues and rectify non-compliant conditions, there was no practicable alternative to constructing in a wetlands

Pursuant to Executive Order 11990, the authority delegated by SAFO 780-1 and 32 CFR part 989 and taking the submitted information into account, I find that there is no practicable alternative to this action that would avoid wetlands during construction activities and the proposed action includes all practicable measures to minimize harm to the environment.

FINDING OF NO SIGNIFICANT IMPACT

Based on a careful review of the analyses and data contained in the attached EA, conducted in accordance with the provisions of NEPA, the CEQ Regulations, and 32 CFR Part 989, I find that the action will have no significant environmental impact, either by itself or cumulatively with other ongoing projects at CCAFS; therefore, an Environmental Impact Statement is not warranted. The signing of this Finding of No Significant Impact completes the environmental impact analysis process.



CARLOS R. CRUZ-GONZALEZ
Colonel, USAF
Deputy Director for Installations



Date

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ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
ACHP	Advisory Council on Historic Preservation
ADP	Area Development Plan
AE	Adverse Effect
AFI	Air Force Instruction
AGE	Aerospace Ground Equipment
AIRFA	American Indian Religious Freedom Act
AM	Airfield Manager
ARPA	Archaeological Resources Protection Act
AST	Aboveground Storage Tanks
ASTG	Aerospace Test Group
ATCT	Air Traffic Control Tower
avg	Average
BA	Biological Assessment
BEBR	Bureau of Economic and Business Research
BMP	Best Management Practices
BO	Biological Opinion
BSI	Boeing Services International
CAA	Clean Air Act
CCAFS	Cape Canaveral Air Force Station
CCSMP	Cape Canaveral Spaceport Management Plan
CEM	Cape Environmental Management, Inc.
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERL	Construction Engineering Research Laboratories
CFR	Code of Federal Regulations
ch.	chapter
CMD	Corrective Measures Design
CMI	Corrective Measures Implementation
CMS	Corrective Measures Studies
CO	Carbon Monoxide
constr.	construction
CRMP	Cultural Resources Management Plan
CS	Confirmation Sampling
CSLA	Commercial Space Launch Act
CUP	Consumptive Use Permit
CWA	Clean Water Act
CZMA	Coastal Zone Management Act

CZMP	Coastal Zone Management Program
dBA	A-Weighted Decibel
DCE	Dichloroethene
DoD	Department of Defense
EA	Environmental Assessment
EDC	Economic Development Commission of Florida's Space Coast
EELV	Evolved Expendable Launch Vehicle
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ER	Eastern Range
ERA	Ecological Risk Assessment
ES	Engineering-Science, Inc
ESA	Endangered Species Act
ESB	Engineering Support Building
ESC	Environmental Support Coordinator
ET	Earth Tech
FAA	Federal Aviation Authority
FAAQS	Florida Ambient Air Quality Standards
F.A.C.	Florida Administrative Code
FCMA	Florida Coastal Management Act
FCMP	Florida Coastal Management Program
FDCA	Florida Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
FOT	Follow-On Test
ft	feet
ft ₂	square feet
FWCC	Fish and Wildlife Conservation Commission
GDSS	General Dynamics Space Systems
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HAP	Hazardous Air Pollutants
HCI	Hydrogen Chloride
HHRA	Human Health Risk Assessment
HMTA	Hazardous Materials Transportation Act
ICBM	Intercontinental Ballistic Missile
IM	Interim Measure
INF	Intermediate Nuclear Forces
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ITE	Institute of Transportation Engineers
KSC	Kennedy Space Center
LOS	Level of Service

LOX	Liquid Oxygen
LT	Long term
LTM	Long Term Monitoring
LUCIP	Land Use Control Implementation Plan
LVC	Launch Vehicle Contractors
MACT	Maximum Available Control Technology
Max	Maximum
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MEK	Methyl Ethyl Ketone
Mgd	Million Gallons per Day
MILCON	Military Construction
µg/m ₃	Micrograms per Cubic Meter
mm	Millimeters
MMPA	Marine Mammal Protection Act
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MR	Mitigation Required
MSL	Mean Sea Level
MST	Mobile Service Tower
MWH	Mega-watt Hours
N/A	Not Applicable
NASA	National Aeronautic and Space Administration
NATO	North Atlantic Treaty Organization
NDE	Non-Destructive Engine
NE	No Effect
NEPA	National Environment Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFRAP	No-Further Remedial Action Planned
NHPA	National Historic Preservation Act
NO ₂	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NO _x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NSA	New South Associates
O ₃	Ozone
OBG	O'Brien & Gere
OCST	Office of Commercial Space Transportation
ODC	Ozone Depleting Chemicals
OPLAN	Operations Plan
OSHA	Occupational Safety and Health Act
OWS	Oil-Water Separator
PAE	Potentially Adverse Effect
PAFB	Patrick Air Force Base
PAH	Poly-nuclear aromatic hydrocarbons

Pb	Lead
PCB	Poly-Chlorinated biphenyl
PE	Positive Effect
PES	Parsons Engineering Science
PHV	Peak-hour Volume
P _{m10}	Particulate matter equal to or less than 10 microns in diameter
P _{m2.5}	Particulate matter equal to or less than 2.5 microns in diameter
POL	Petroleum Products, Oils, Lubricants
PPE	Personal Protective Equipment
ppm	Parts per million
PSD	Prevention of Significant Deterioration
RACM	Regulated Asbestos Containing Material
RCRA	Resource Conservation Recovery Act
R&D	Research and Development
RFI	RCRA Facility Investigation
ROI	Regions of Influence
SAP	Satellite Accumulation Points
SCTL	Soil Cleanup Target Level
Secs.	Sections
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJRWMD	St. Johns River Water Management District
SLC	Space Launch Complex
S _{o2}	Sulfur Dioxide
SPCC	Spill Prevention Control Countermeasures
SR	State Route
SRM	Solid Rocket Motor
SRMC	Sustainment, Restoration and Modernization Construction
SSC	Species of Special Concern
SW	Space Wing
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TCE	Trichloroethylene
T&E	Threatened and Endangered
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substance Control Act
TSD	Treatment, Storage or Disposal
TSDF	Treatment, Storage or Disposal Facility
TSP	Total Suspended Particulate
U	Unknown Effect
UFC	Unified Facilities Criteria
U.S.	United States
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USEPA	U.S. Environmental Protection Agency

USFWS U.S. Fish and Wildlife Service
V/C Volume-to-Capacity
VC Vinyl Chloride
VOCs Volatile Organic Compounds
WWTP Wastewater Treatment Plan

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations require federal agencies to prepare an Environmental Assessment (EA) to evaluate the potential impacts of Federal actions on the surrounding environment. The United States Air Force (USAF), 45th Space Wing (SW), is the lead agency for NEPA compliance on this proposed project. According to CEQ regulations, it is required that an EA provide evidence and analysis to determine whether a Proposed Action might have significant effects that would require preparation of an Environmental Impact Statement (EIS). If the analysis determines that the environmental effects will not be significant, a Finding of No Significant Impact (FONSI) will be prepared.

This EA evaluates the potential environmental impacts associated with a number of individual projects planned which would accomplish improvements to the Cape Canaveral Air Force Station (CCAFS) Skid Strip. As the facility no longer operates as a missile skid strip, it will be referred to as the "Airfield" throughout the majority of this EA. A total of 29 Sustainment, Restoration, and Modernization Construction (SRMC) projects and four Military Construction (MILCON) projects, which are designed to update and eliminate certain safety issues and bring the Airfield into compliance with current USAF instructions, are evaluated for environmental impacts. Program initiation is expected in 2009 with ultimate completion in 2020.

This EA has been prepared in accordance with the requirements of the NEPA of 1969, 42 United States Code (USC) Sec 4321 et seq., the CEQ regulations, 40 Code of Federal Regulations (CFR) Secs 1500-1508 Environmental Impact Analysis Process (EIAP), as promulgated in Title 32 of the CFR Part 989, and Department of Defense (DoD) Directive 6050. The Proposed Action generally includes the establishment of a clear zone around the Airfield, which will result in the removal of approximately 410 acres of vegetation; rerouting or the enclosing of two ditches; demolition of the existing control tower and associated buildings; construction of a new control tower, operations building, and aircraft parking apron, which will result in the removal of approximately 37 acres of vegetation; installation of a perimeter fence; and, removal/relocation of utilities, poles, fire hydrants, etc. A complete list of the projects are provided in Appendix A.

1.2 LOCATION AND BACKGROUND

The Canaveral Peninsula is on the east coast of Brevard County, Florida, approximately 155 miles south of Jacksonville, 210 miles north of Miami, and 60 miles east of Orlando. It is 4.5 miles wide at its widest point (Figure 1-1). CCAFS has 81 miles of paved roads connecting various launch support facilities with the centralized Industrial Area. The northern boundary of CCAFS adjoins the Kennedy Space Center (KSC) boundary on the barrier island. The Banana River separates CCAFS from KSC to the west. The Port of Cape Canaveral adjoins CCAFS to the south. Cape Canaveral Air Force

Station's eastern boundary is the Atlantic Ocean. The base is accessible primarily from State Road 528 to the south and from KSC which is to the west and north. There are currently four active and 12 inactive launch pads at 12 Space Launch Complexes (SLCs) and a 10,000 foot east-west runway that has historically been called the "Skid Strip" (Figure 1-2).

Along with the various launch and support facilities, CCAFS maintains a centralized industrial complex to support the technical, mechanical, and administrative needs of each launch program. The industrial complex contains structures that support the SLCs and includes warehouse and hangar space used to store critical spares and package payloads, and serves as a base of operations for Civil Engineering, base operations, and command personnel.

Historically, CCAFS has been selected as the location for construction of facilities to launch several types of intermediate and long-range ballistic vehicles (e.g. Atlas, Delta, Titan). Since the mid-1950s, CCAFS has been the launch-head for the Eastern Range and launches have largely been associated with Air Force, government and civilian payload and space vehicle operations. The 45th Space Wing is currently the host wing, under USAF Space Command, and conducts east coast military, civilian, and commercial launch operations.

The Skid Strip (the runway or Airfield) was constructed in 1952 as a Missile Landing and Test Facility. Although aircraft used the runway for take offs and landings and guidance documents existed concerning operation of a USAF runway, the property category code change and application of guidance did not occur until 1994. Serious safety and operational deficiencies were then found. An initial phase of corrective actions eliminated several immediate concerns. That phase also developed recommendations for completing remaining deficiencies and for addressing longer term projects to support growth and planning strategies for the next 20 to 50 years; those actions provided the basis for the CCAFS Skid Strip Area Development Plan (ADP) dated September 30, 2004 (Appendix C). The CCAFS ADP contains the background justification for the Proposed Actions discussed in this EA. The Airfield currently operates with over 30 different Safety of Operations Waivers.

1.3 PURPOSE AND NEED FOR ACTION

Through the years, the Cape Canaveral Spaceport has been on the leading edge of technological innovation. However, the relatively recent and required application of runway guidance as described in the Unified Facilities Criteria (UFC) instructions, and the aging infrastructure, have resulted in significant safety violations and potential limitations to the CCAFS' ability to meet the needs of existing and future missions. On average, 80 operations (either a landing or takeoff) are logged at the Airfield per month. Typically, the Airfield is utilized by the USAF to land and off-load C-5s and AN-124s, as well as being utilized by numerous distinguished visitors and local units training with night vision devices and para-drops. It also serves as an emergency landing facility for the space shuttle. The average number of operations conducted at the Airfield each month is anticipated to grow given the increase in mission support requests from other

organizations such as the State Department. The Skid Strip ADP addresses the safety violations and other limitations through a two-phase approach: 1) implement short-term projects designed to increase safety and 2) execute long-term MILCON projects developed to support the existing and future 45th SW missions.

The projects programmed by the ADP will enhance safety by reducing airfield violations and eliminate the need for waivers to operate. Designed to eliminate safety deficiencies and correct facility deficiencies, the ADP projects will enhance the existing mission and safety while the MILCON projects will build long-term solutions to respond to existing and changing needs. This program complies with both the short and long-term visions of the future established in the 50 year Cape Canaveral Spaceport Master Plan (CCSMP) and the CCAFS General Plan.

Critical to the continued support of space flight mission success, these projects deal directly with the safety and structural condition of the Airfield apron. Safety violations, expansion limitations and pavement condition concerns reveal a reduced ability of the apron to support existing and future missions. Reviews of the CCSMP and the CCAFS General Plan ensured the program's compliance with all adopted short and long-term planning objectives. The CCAFS General Plan, a short-term planning document, discusses growth and planning strategy for the next 20 years. The CCSMP, a long-term planning document, envisions strategic planning for the next 50 years. Together, they provide the basis for the Skid Strip ADP.

The proposed action must satisfy the following three goals outlined in the CCAFS General Plan. Supporting these goals outlined below, are eight essential objectives that are indicators to be used when determining a future course of action and the action's success. These will enhance safety, meet the needs of the existing mission, and develop CCAFS' image as the world's premier spaceport while allowing CCAFS to successfully meet future missions. The following is a list of the three goals and eight objectives adopted from the CCAFS General Plan:

Goal 1: Continual Improvement Toward Mission Excellence

- Objective 1.1: Site and develop facilities for optimal accomplishment of the launch mission.
- Objective 1.2: Improve infrastructure to support mission growth.
- Objective 1.3: Improve and modify facilities to better serve future launch customers.
- Objective 1.4: Enhance compliance with the 45th SW Facilities Excellence Plan Architecture Guidelines

Goal 2: Continual Improvement in Protection of the Natural and Human Environment

- Objective 2.1: Pursue all potential pollution prevention opportunities.
- Objective 2.2: Minimize the destruction of endangered and/or threatened species habitats.

Goal 3: Continual Quality of Life Improvement

Objective 3.1: Enhance Safe Working Conditions for the CCAFS work force.

Objective 3.2: Provide a morale-enhancing work environment for the work force.

Currently, the Cape Canaveral Skid Strip and airfield support facilities do not comply with USAF Instructions, the CCSMP, or the CCAFS General Plan. The Skid Strip runway and all of the support facilities are non-compliant with lighting, design or safety instructions found in the following USAF regulations:

- UFC 3-260-01 Airfield and Heliport Planning and Design;
- Air Force Handbook (AFH) 32-1084 Facility Requirements Handbook;
- UFC 3-535-01 Visual Air Navigation Facilities;
- UFC 3-260-02;
- Federal Aviation Authority (FAA) Advisory Circular 150/5345-12C Specification for Airport and Heliport Beacon.

The runway and airfield support facilities are also not compliant with the stated goals of the Air Force General Plan adopted June 2002. As discussed in the most recent Airfield Waiver Package, the Skid Strip currently operates with over 30 safety waivers. The Skid Strip ADP discusses in detail the non-compliant facilities operating under these safety waivers. Items needing required action follow.

Trees inside of the airfield surfaces will be removed. Any problems associated with airfield operations, in this case trees within airfield surfaces, require Notice to Airmen (NOTAMS) or trouble ticket notices (Trouble T's) to be published with the FAA; these problems will be targeted for elimination.

Rerouting or diverting of drainage ditches around the clear zone is required as they violate the grading criteria found within UFC 3-260-01 which states, "twenty-seven percent of all accidents occur within the clear zone either upon arrival or departure." The criteria explain that the surfaces are to be level and not contain depressions or mounds. Currently, a waiver exists for this violation. The project which addresses the eastern ditch (DBEH 00-1630) also addresses reconfiguration of four man-made drainage swales currently located within the clear zone limits.

Existing gates and bollards that prevent access to the runway will need to be moved to their sited locations as they violate UFC 3-260-01. Moving these obstructions will eliminate an airfield waiver.

An abandoned camera pad located at the approach end of Runway 13 and inside of the primary and transitional surfaces and the graded area of the Clear Zone violates UFC 3-260-01 and will need to be removed. The removal will eliminate one airfield obstruction requiring a safety waiver.

Airfield warning lights currently located within the transitional surface will need to be lowered or relocated outside of the transitional surface. They are currently in violation of UFC 3-260-01.

Paved overruns are to be installed and standard approach lighting is to be corrected or installed. Currently, the Airfield's approach lighting is in violation of standard lighting criteria.

The wooden pole that supports the air traffic control tower (ATCT) radio equipment is to be removed or relocated. Positioned inside of the primary surface, this pole seasonally supports bird nests and creates a potential Bird Air Strike Hazard requiring a safety waiver.

Apron shoulders will be installed to increase aircraft parking area. This will eliminate safety waivers resulting when aircraft are forced to park so closely that wingtip clearance is insufficient. Currently, the apron is asphalt with concrete pads, which limit and/or restrict parking, rather than being in accordance with governing guidance which requires it to be entirely compliant.

1.4 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This EA presents the analysis and description of potential environmental impacts that could result from the implementation of the Skid Strip development program. As appropriate, the affected environment and environmental consequences of the Proposed Action and Alternatives are presented by site-specific descriptions. Additionally, since all planned ADP projects are subject to funding authorization constraints, as well as Fiscal Year programming, this EA assumes that all analyzed projects will be implemented between 2009 and 2020. Implementation of certain projects in out years may require a review of this EA to ensure current applicability. Additionally, as new mission requirements are identified, further analysis may be required to address potential cumulative impacts associated with past, present and future actions related to Airfield operations.

Various other minor repairs to the airfield were previously analyzed in work orders that supported a Categorical Exclusion in accordance with 32 CFR 989. These minor repairs/modifications would not contribute to any cumulative impacts associated with the work covered in this EA.

This EA considered eleven environmental resources to provide a context for understanding the potential effects of the Proposed Action and a basis for assessing the significance of potential impacts. Federal and state environmental statutes, which set specific guidelines, regulations and standards, regulate most resource areas and are listed in Section 1.5 below. The resources considered in this analysis include:

- Air Quality,
- Biological Resources,

- Geology and Soils,
- Water Resources,
- Hazardous Waste and Material Management
- Cultural Resources,
- Infrastructure and Transportation,
- Health and Safety,
- Noise,
- Land Use and Zoning, and
- Socioeconomics.

Section 2 of this EA describes the proposed action, the no action alternative, alternatives considered but not carried forward and environmental issues eliminated from detailed analysis. Section 3 describes the existing conditions of specific environmental resources that could be affected by implementation of the proposed action and alternatives. Section 4 discusses how those resources would be affected by implementation of the proposed action alternatives.

1.5 AGENCIES INVOLVED IN THE ENVIRONMENTAL ANALYSIS

The representative federal and state agencies and respective regulations, statutes and permits which may be applicable for the proposed project are presented in Table 1-1.

Table 1-1
Federal and State Agencies Applicable to the Implementation of the Proposed Action

Regulatory Agency	Federal Law	Activity or Requirement
US Environmental Protection Agency (USEPA): Florida Dept. of Environmental protection (FDEP)	Clean Air Act (CAA) of 1970 (42 USC 7401 et seq.)	Mandates that applicable state and national air quality standards must be maintained during the operation of any emission source. National Ambient Air Quality Standards include primary and secondary standards for various pollutants. The primary standards are mandated by the CAA to protect public health, while the secondary standards are intended to protect the public welfare from adverse impacts of pollution, such as visibility impairment.
US Environmental Protection Agency (USEPA): Florida Dept. of Environmental protection (FDEP)	Clean Air Act (CAA) of 1970 (42 USC 7401 et seq.)	
USEPA, FDEP	Clean Air Act Amendments of 1990	Established new federal nonattainment classifications, new emissions control requirements, and new compliance dates for areas in nonattainment. The

		requirements and compliance dates are based on the nonattainment classification.
USEPA; FDEP; St John River Water Management District (SJRWMD)	Clean Water Act (CWA) of 1977 as amended (33 USC 1251 et seq.)	Prohibits the discharge of pollutants from a point source into Navigable Waters of the United States, except in compliance with a National Pollutant Discharge Elimination System (NPDES) Permit (40 CFR Part 122). The Navigable Waters of the United States are considered to encompass any body of water whose use, degradation, or destruction will affect interstate or foreign commerce.
US Department of the Interior, National Park Service	Archaeological Resources Protection Act (ARPA) of 1979 (USC 470aa-mm), Supplemental Regulations of 1984	The ARPA secures protection of archaeological resources and sites on public and Indian lands; requires permitting for any excavation or collection of archaeological material from these lands; provides civil and criminal penalties for violations.
US Department of the Interior, Advisory Council on Historic Preservation	National Historic Preservation Act (NHPA) of 1966 as amended (16 USC 470 et seq.)	The NHPA is the key federal law establishing the foundation and framework for historical preservation in the United States. The Act authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (National Register); it establishes an Advisory Council on Historic Preservation (Council) as an independent federal entity; it requires federal agencies to take into account the effects of their undertakings on historic, and to afford the Council an opportunity to comment upon any undertaking that may affect properties listed, or eligible for listing, in the National Register; and it makes the heads of all federal agencies responsible for the preservation of historic properties owned or controlled by them.
US Department of the Interior, Advisory Council on Historic Preservation	National Historic Preservation Act (NHPA) of 1966 as amended (16 USC 470 et seq.)	
US Department of the Interior Fish and Wildlife Service	Endangered Species Act (ESA) of 1973 (7 USC 136; 16	Declares the intention of Congress to conserve

(USFWS)	USC 460 et seq.)	threatened and endangered species and the ecosystems on which those species depend. The ESA requires that federal agencies, in consultation with the USFWS and the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), use their authorities in furtherance of endangered or threatened species.
USFWS	Section 7 of the ESA (16 USC 1536)	Contains provisions that require federal agencies to consult with the Secretary of Interior and to take necessary actions to insure that the actions authorized, funded, or carried out by them do not jeopardize the continued existence of endangered species and threatened species.
USFWS	Migratory Bird Treaty Act (MBTA) of 1918 as amended (16 USC 703-712)	The MBTA implements various treaties and conventions between the US and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful.
Florida Department of Community Affairs	Coastal Zone Management Act (CZMA) of 1972 (16 USC 2452-24645)	The CZMA plays a significant role in water quality management. Under the CZMA, a Federal action that may affect the coastal zone must be carried out in a manner that is consistent with state coastal zone management programs.
USEPA; FDEP	Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901 et seq.); Title 40 CFR 270; Chapter 403.704, 403.721, 403.8055, Florida Statutes (FS); Chapter 62-730.180, Florida Administrative Code (F.A.C.)	This Act gives the USEPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes.



FIGURE 1-1 CAPE CANAVERAL LOCATION MAP



CCAFS LOCATION
BREVARD COUNTY, FLORIDA

DRAWN BY: CLB

REFERENCE: MAP OF CCAFS,
FLORIDA
PREPARED BY: AEROSTAR
ENVIRONMENTAL SERVICES

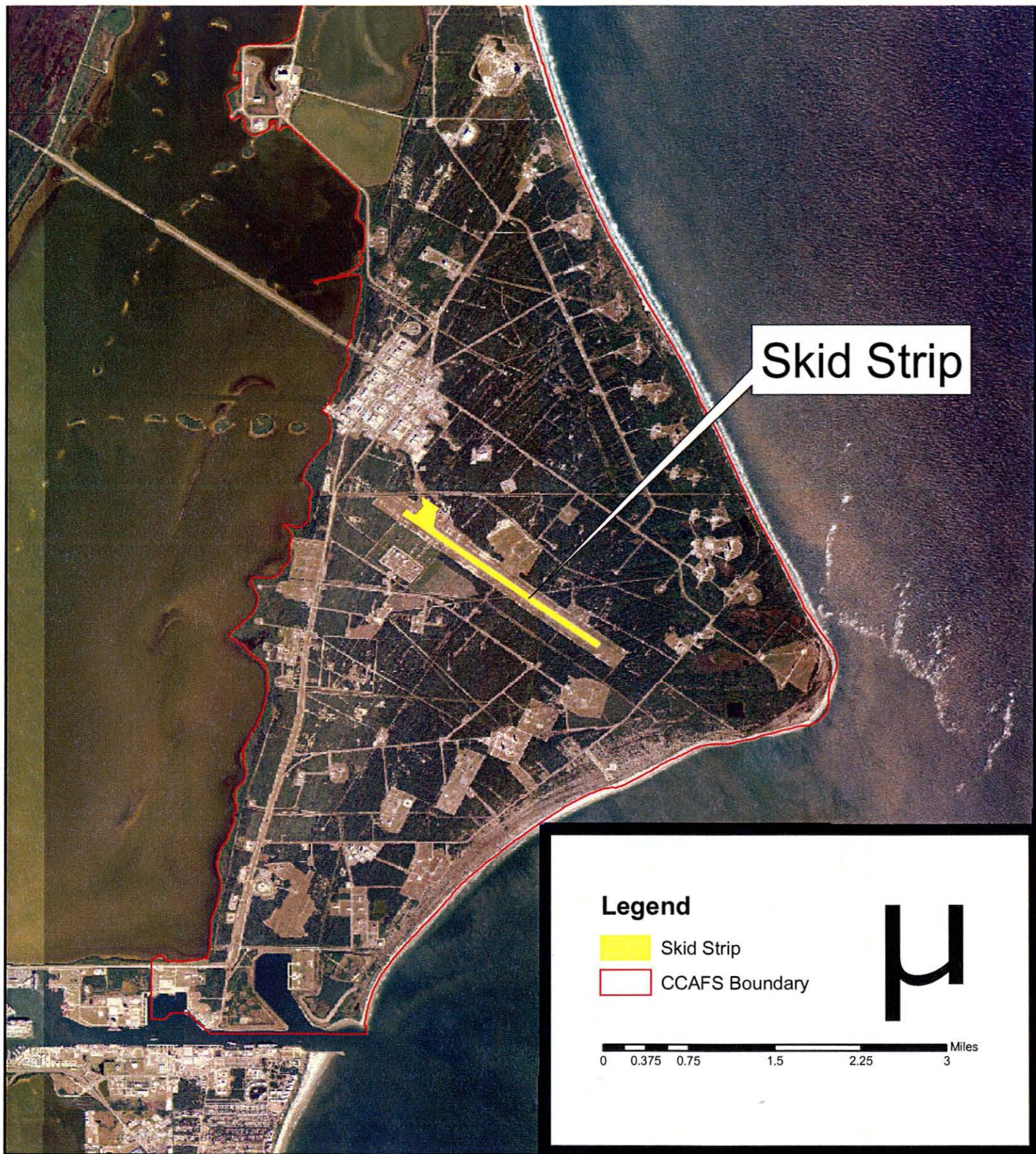


FIGURE 1-2 SKID STRIP AIRFIELD LOCATION MAP



Environmental Assessment for Skid Strip Projects
Cape Canaveral Air Force Station
Cape Canaveral, Florida

REFERENCE MAP OF FLORIDA
PREPARED BY:
AEROSTAR Environmental Services, Inc.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action, Alternatives to the Proposed Action including the No-Action Alternative, and potential environmental issues with a brief explanation of compensation plans and regulatory requirements.

2.1 DESCRIPTION OF PROPOSED ACTION

The Proposed Action is a combination of four MILCON projects and 29 inter-related SRMC projects. The MILCON projects include constructing a parking apron on the south side of the existing runway and associated east and west taxiways that will cover approximately 11 acres; construction of a new 65 foot tall control tower; construction of a new Airfield Manager (AM) Operations Building which would adjoin the new tower; and the construction of a new Airfield perimeter fence. Each of these elements of the Proposed Action is further described below. The MILCON projects will result in the destruction of approximately 37 acres of vegetation/habitat. The locations of the MILCON projects are presented in the Skid Strip ADP (Appendix C).

The listing and individual description of the SRMC projects included in the Proposed Action are also described below and listed in Appendix A.

2.1.1 Description of the MILCON Projects

Apron

The proposed apron is designed to accommodate four C-5/Antonov sized aircraft with all proper wingtip clearances maintained. The current siting plan has the apron located on the south side of the runway and approximately 3,500 feet east of the existing west end. The construction would include required taxiways (east and west) for entry and exit from the runway. Existing operational capacity will be maintained while allowing for some operational expansion. The existing parking apron is faulty by design; it was sited within the runway lateral clearance distance making aircraft that park on the southern half obstructions to landing traffic. The rectangular portion was constructed of millings resulting in aircraft sinking, which later resulted in concrete pads being added. UFC 3-260-02, Paragraph 6, dictates aircraft parking areas and areas that may have fuel spilled on them be constructed of concrete, not asphalt, to avoid this. Also, by design, parking is now limited to the concrete pads. The proposed new apron on the south side of the runway eliminates these issues. Placing the apron on the south side avoids a solid waste landfill which is located on the north side of the runway.

The new apron is specially designed for ease of unloading large frame cargo aircraft like the C-5 or the Antonov. The western most parking spot has more than double the length of a C-5's interior cargo space, allowing for payloads and rocket segments to be off-loaded without closing the remainder of the ramp or the adjacent taxiway, as is the current practice. The proposed apron will also increase safety by eliminating unloading operations inside of the primary surface (within 1,000 feet of runway centerline). The added surface area would be approximately 13.45 acres of impervious concrete, which

would require approximately 24 acres of additional dry stormwater retention and a change to the SJRWMD stormwater management permit. All required lighting, markings, and other standard features would be included in construction and all work would be in compliance with current UFC and other FAA and USAF instructions for airfield construction and operation (Figure 2-1).

The location of the proposed apron was determined by taking into consideration several factors including the UFC, existing area conflicts, the requirement to be immediately adjacent to the skid strip, and future plans for the CCAFS. There is a large Solid Waste Management Unit (SWMU) located on the north side of the existing skid strip; there are no Installation Restoration Program (IRP) sites or Solid Waste Management Units (SWMU) located in the proposed area.

The location will also have easy close access from the existing Flight Control Road, which eliminates other potentially more intensive road construction on the north side.

Air Traffic Control Tower

The Air Traffic Control Tower or ATCT, co-located with the AM Ops Building, at the midfield location, is required to be at least 65 feet tall and consist of a minimum of five stories in accordance with UFC 3-260-01 and AFH 32-1084 Facility Requirements, 5.9.1.2.3. The ATCT may be in the same building as the AM Operations building. The tower will be constructed on the south side of the runway at approximately midfield location and outside of the protected area. It will be adjacent to and part of the proposed AM Operations Building. It will be tall enough so operators may see both ends of the runway. This is highly desirable for economy of effort and improved communication. The proposed ATCT is designed for multiple controllers, is at the proper location and has room for all required ATCT equipment and instruments. The ATCT's ability to support multiple controllers allows for expanded operations and for increased flight capacity.

Constructing a new ATCT at the location proposed by this Action will enhance safety in four ways. First, locating the ATCT midfield, gives the controller the best view of both ends of the runway. Second, elevating the tower to the recommended height of 65 feet or taller will increase the controller's ability to recognize anomalies and make necessary corrections. Third, relocating the tower outside of the primary and transitional surfaces reduces the risk of an accident when an aircraft arrives or departs the runway. Fourth, the new location places inhabited buildings further away from future planned launch activity located on the northern portion of CCAFS. Co-location of facilities allows more effective operational control and reduces any "footprint" disturbances to the physical environment. Co-location of facilities also supports goals number two and three discussed in Section 1.

Airfield Manager Operations Building

The proposed AM Operations facility/building at the Airfield has been designed to accommodate all of the requirements of the existing mission, and to allow for

expansion. Adequate office space is available in the new tower for an Air Traffic Controllers office, or in the AM Operations facility proper. An aircrew lounge is available adjacent to the break room. Conference and training facilities are included as well as a new distinguished visitor (DV) lounge and a private DV restroom. The large bay on the south side of the facility is intended to store Aircraft Ground Equipment (AGE). Currently, the AGE is stored out in the open adjacent to Ops Flight Planning parking lot. The new facility will allow all the AGE to be stored out of sight and out of the corrosive air, in a controlled environment which will extend equipment life. Later as the mission expands, the AGE bay can be converted into offices and the AGE can be relocated. The construction of the building will be on the south side of the runway in accordance with AFI 32-1084 and the Skid Strip Area Development Plan. Placing the building on the south side avoids the SWMU on the north side and creates a more efficient operation by being co-located with the tower and new Apron.

Perimeter Fence

Installation of a fence around the airfield is also planned. The fence would be six feet high, run approximately 23,000 feet around the outside of the Airfield fragility zone and be located outside the proposed apron, new tower and operations building. This project will increase safety for personnel and pilots by reducing the risk of an airfield incursion by unauthorized personnel, vehicles or wildlife, such as deer. The fence would have a minimum 30 foot clear zone on its outer side.

2.1.2 Description of the SRMC Projects

For the purposes of this EA, the projects have been assigned area numbers that correspond to each area that will be cleared over a period of several years. Area 7 is associated with clearing for construction of the new facilities and overlaps somewhat with the clearing to be done around the airfield. Table 2-1 provides a summary of the priority of clearing to be done and the amount required for each area. It also includes the Land Management Units (LMUs) that will be impacted by the clearing. Figure 2-1 provides an illustration of where the clearing will occur, with the numbers in the highlighted areas corresponding to the areas in Table 2-1. The requirement to accomplish these projects in their current location is predicated by the need to eliminate safety concerns associated with the airfield.

Clear Trees and Land

Eleven individual projects have been created to clear and remove all heavy brush and trees inside of the airfield imaginary clearance surfaces. These projects target trees that violate the airfield imaginary clearance surfaces and require NOTAMs and "Trouble T's" to be published with the FAA. This project specifically addresses Objectives 2.2 and 3.1 of the ADP - minimize the destruction of endangered and/or threatened species habitats and enhance safe working conditions. The total area expected to be affected by these projects is approximately 410.83 acres as shown in Table 2-1. This is based on guidelines in UFC 3-260-01 which states that land should be level graded 1,000 feet each side of the runway (from centerline) and continue so that the 7:1 transitional slope is not violated. This will call for an additional 72 feet of clear land (7 x 6' + 30'), inside of

which will be placed the fence, with 30 feet of clear land before scrub trees are encountered.

TABLE 2-1 Acreage Affected by Implementing the Preferred Alternative.

Area	Project Number	FY	Area	Acreage	Compartment # (Land Mgmt)
1	DBEH 00-1631	09	East Clear Zone, Zone of Frangibility, Approach Departure	57.27	72, 73
2	DBEH 03-1576	10	West Clear Zone, Zone of Frangibility, Approach Departure	56.57	38, 39, 49
3	DBEH 04-1640	10	Primary/Transitional	27.07	73
4	DBEH 04-1641	10	Primary/Transitional	20.61	70, 72
5	DBEH 04-1642	11	Primary/Transitional	26.30	75
6	DBEH 04-1643	12	Primary/Transitional	37.94	65, 70
7	Multi	12	Apron, Hangar, Taxiway	37.00	66
8	DBEH 04-1644	13	Primary/Transitional	26.30	75
9	DBEH 04-1645	14	Primary/Transitional	46.68	66
10	DBEH 04-1646	15	Primary/Transitional	32.04	47
11	DBEH 04-1647	16	Primary/Transitional	18.31	66
12	DBEH 04-1648	17	Primary/Transitional	24.74	48
			TOTAL	410.83	

FIGURE 2-1 CCAFS SKID STRIP



Figure 1
Areas to Cleared

The following four items found in the UFC are the driving requirements for land and tree clearing projects.

1. Mandatory Zone of Frangibility (500 feet centered on the runway centerline x 16,000 feet box). The frangibility zone is the area in which an object must collapse or fall over when struck by a moving aircraft such as to cause minimal damage to the aircraft, not impede the motion of the aircraft, or radically alter the path of the aircraft.
2. Clear zone grading area (1,000 feet from threshold and 1,000 feet each side of runway extended centerline) to be free, clear and grubbed of all obstructions due to the highest probability of an accident in this area.
3. 50:1 approach/departure surface area, starting 200 feet from the threshold object, must be 50 feet away for each foot of rise. Trees are required to be maintained a minimum of 10 feet below penetration of this imaginary surface.
4. 7:1 transitional surface – no object is to be above the surface of the ground within 1,000 feet of runway centerline (existing tree line is at 500 feet). At the end of the 1,000 feet a 7:1 ratio begins for each foot of rise the object must be an additional seven feet away from the runway centerline to be compliant.

Clear Re-routing / Cover Ditches through the Clear Zone

Two projects have been created to re-route or culvert portions of the ditches that intersect the clear zone. The ditch on the west end (Project DBEH 04-1618) needs to be re-routed or contained in a culvert, as some of it is inside the graded area of the clear zone and inside of the area of frangibility. A design to enclose the western ditch is the most cost effective way to proceed, since this approach will also eliminate the possibility of negatively affecting an IRP site ground-water plume on the west end of the Airfield runway with excavation. The ditch on the east end (Project DBEH 00-1630) needs to be enclosed in a culvert where it passes through the zone of frangibility. This project also addresses grading work for the reconfiguration of four ditches or swales that are within the airfield clear zone in order to comply with UFC criteria 3-260-01 (17 Nov 2008). Those four swales tie into the east end and west end ditches. These projects will improve the safety of the runway for the accomplishment of the launch mission, improve and modify facilities to best serve future launch customers, enhance safe working conditions for the CCAFS work force and eliminate airfield safety waivers. Discussions with the SJRWMD and the U.S. Army Corps of Engineers (USACE) indicated that the east ditch would not be jurisdictional under the CWA. However, the west ditch would most likely be jurisdictional wetlands due to its connectivity to Banana River (45th SW Meeting, 27 February 2007).

Demolition of the Old Tower, Air Ops Center and Old Parking Apron

As part of the plan to eliminate safety concerns in the clear zone, once the new Tower, Air Operations Building and aircraft parking apron are constructed, the old facilities will be demolished, following USAF safety and demolition regulations. Removal of the old parking apron, which is constructed of concrete and asphalt, will reduce the amount of impervious surface area.

Other Related Projects

The following projects remain as part of the SRMC project and are planned to be completed as part of the Proposed Action.

- Gates and Bollards – Once the clearing related projects are completed, the existing gates and bollards that prevent access to the runway will be relocated to their revised sited locations. Moving these obstructions will eliminate an airfield safety waiver and enhance safe working conditions for the CCAFS work force.
- Rotating Beacon – Install an Airfield Rotating Beacon to increase safety on the airfield and to comply with USAF directives.
- Area Warning Lights – Lower or relocate the airfield warning lights outside of the transitional surface to comply with UFC 3-260-01. This proposed project will increase safety on the airfield by removing an obstruction to landing aircraft.
- Cruciform Foundations – Install cruciform foundations for the Mobile Aircraft Arresting Unit used in conjunction with the bi-annual NAVY F-15 test program. As discussed in the Skid Strip Development Plan, installation of these foundations will enhance the accomplishment of the existing mission and will improve infrastructure to support mission growth. At the same time, this project will increase pilot safety, eliminate the need to write a bi-annual temporary safety waiver package, and eliminate the need to excavate and bury anchors on both sides of the runway.
- Signs Around the Airfield – Once designated areas are cleared, certain signs will be exposed in the safety area. This project will remove and re-install controlled area signs as appropriate at new locations. Completion of this project will increase safety and eliminate an airfield waiver in compliance with 45th SW goals and objectives.
- Grade and Sod to 500 feet – Two projects have been created to readdress the violations to the lateral clear zone. These projects, when complete, should standardize grading to criteria, and may eventually eliminate the requirement for an airfield safety waiver.
- Paved Overruns and Approach Lights – Four projects have been created to install paved overruns and correct or install standard approach lighting during construction of the new apron. Currently, the Airfield's approach lighting is in violation of standard lighting criteria. These projects will increase safety and eliminate two airfield safety waivers. In accordance with in accordance with UFC 3-260-01, 1,000 foot paved overruns are required for Class B runways. An ALSF-1 is the USAF standard for the CAT 1 Runway. The Airfield has a short approach lighting system (SALS) on the approach of Runway 31. The system is only 1,000 feet in length rather than the required 1,500 feet. A SALS requires a Major Command waiver since it is not the USAF standard, and requires an additional waiver because it is shorter than required.

- ATCT Radio Antenna – Remove or relocate the wooden pole and supported ATCT radio equipment. Removal of this pole, which is positioned inside the primary surface area, and/or relocation of the ATCT equipment will eliminate one airfield safety waiver and increase safety on the apron.
- Install Apron Shoulders - The Airfield Apron is too small for the existing mission. Presently, it is relatively common for as many as three C-5s to arrive with rocket segments or payloads at the same time. This has resulted in a wingtip clearance violation and required an airfield safety waiver. In order to correct this safety waiver, paved shoulders will be included with the new apron as far out as possible without impacting the large drainage ditch. Second, culverts would be added in all small drainage swales adjacent to the apron. Third, fill would be added to the surrounding land surface and grading would occur to meet the established criteria to the maximum extent possible. These changes will reduce the level of risk associated with two pending airfield safety waivers.
- Install Concrete Runway Ends – Install runway ends in accordance with UFC 3-260-02, Paragraph 7. Concrete is required because it will hold up to the weight applied during landings. Concrete runway ends will eliminate asphalt shoving. The runway ends will be 1,000 feet as required for Class B runways under UFC 3-260-02.
- Remove Camera Pad – An abandoned camera pad located at the approach end of Runway 13 and inside of the primary and transitional surfaces and the graded area of the clear zone violates UFC 3-260-01 and needs to be removed. The removal will eliminate one airfield obstruction requiring a safety waiver.

2.2 ALTERNATIVE 1 - REDUCE AIRFIELD WAIVERS

A second option (Alternative 1) available to the 45th SW is completing all of the SRMC programmed projects (not including the MILCON projects) identified and phased through the Skid Strip ADP project.

This alternative reduces the airfield safety waivers, increases safety, and increases the ability to meet the needs of the existing mission. Removal of 410.83 acres of potential scrub-jay habitat would still occur and compensation would still be required. The most important component of this alternative is increase safety for personnel, payloads, and equipment at the Airfield. Completion of all SRMC projects programmed in Phase I of the Skid Strip ADP will correct all on-airfield obstructions presently requiring safety waivers. A discussion of the projects and their benefit to the Airfield is included in Section 2.1.2.

While completing all of the projects programmed for the Skid Strip under this alternative will ultimately increase safety in the short-term, the ability of these facilities to support the future missions and long-term problems remain un-addressed. This option will not eliminate the hazards to flight safety caused by the ATCT, Ops Flight Planning Building or parking aircraft on the apron. The USAF General Plan adopted in June 2002 set out four goals necessary for a successful transition into the future. Three of these goals

directly relate to this ADP. They are: Continual Improvement Toward Mission Excellence; Continual Improvement in Protection of the Natural and Human Environment; and Continual Quality of Life Improvement. These three goals are supported by the following eight essential objectives that are indicators to be used when determining a future course of action, and success of that action.

Objective 1.1: Site and develop facilities for optimal accomplishment of the launch mission.

Objective 1.2: Improve infrastructure to support mission growth.

Objective 1.3: Improve and modify facilities to better serve future launch customers.

Objective 1.4: Enhance compliance with the 45th SW Facilities Excellence Plan Architecture Guidelines

Objective 2.1: Pursue all potential pollution prevention opportunities.

Objective 2.2: Minimize the destruction of endangered and/or threatened species habitats.

Objective 3.1: Enhance Safe Working Conditions for the CCAFS work force.

Objective 3.2: Provide a morale-enhancing work environment for the work force.

Alternative 1 fails to address all of these objectives. Once the addition to the Ops Flight Planning Building is constructed, it still will not support mission growth or serve future launch customers. The existing airstrip facilities will still be in violation of safety provisions inside of the primary surface and the ATCT will not meet recommended height and size guidance. This option is not fully compliant with the 45th SW Facilities Excellence Plan; it will not completely eliminate all safety issues, and it will not provide a morale-enhanced work environment. Finally, implementing this alternative will not best serve future launch customers or assist CCAFS in meeting the 45th SW vision of being the premier gateway to space. Therefore, this alternative has been eliminated from further discussion in this EA.

2.3 NO - ACTION ALTERNATIVE

The No-Action alternative is accepting the status quo. It would include maintaining the airfield safety waiver packages and completing projects necessary for approval of the annual airfield safety waiver package. By choosing this alternative, no action is necessary as the annual waiver package has already been approved. However, the No-Action alternative negatively affects current operations for two reasons. First, this alternative incorrectly presumes that the safe history of operations on the airfield predicts a safe future, and it does not strive to achieve any of the goals adopted through the General Plan and listed in the ADP. Second, this alternative does not enhance or improve safety, does not improve mission infrastructure to support mission growth and does not assist in accomplishing the long-term mission. Further, the No-Action alternative does not comply with USAF guidance provided in UFC 3-260-01, Section A2.2.2.1.1, which directs the establishment of temporary waivers for correctable

obstructions. Temporary waiver requests must indicate the action planned to correct the violation and an estimated completion date.

2.4 POTENTIAL ENVIRONMENTAL ISSUES

Three environmental resources have the potential to be impacted by implementation of the proposed action. They are; biological, cultural, and water resources. These resources are discussed in Sections 3 and 4. All other environmental resources, briefly discussed below, have been eliminated from detailed analysis since impacts from the proposed action will be negligible or minor.

2.4.1 Issues Eliminated from Detailed Analysis

Resources that will not be impacted, or will be minimally impacted include geology and soils, air quality, hazardous materials and waste, infrastructure and transportation, health and safety, noise, land use and zoning, and socioeconomic. These resources, therefore, have been eliminated from further detailed analysis.

2.4.1.1 Geology and Soil

The CCAFS topography consists of a series of relic dune ridges formed by wind and wave action, indicating that gradual beach deposits occurred throughout time. The higher naturally occurring elevations are found along the eastern portion of CCAFS, with a gentle slope to lower elevations toward the marshlands along the Banana River.

The geology underlying CCAFS can be generally defined by four stratigraphic units: the surficial sands, the Caloosahatchee Marl, the Hawthorn Formation, and the limestone formations of the Floridan Aquifer. The surficial sands immediately underlying the surface are marine deposits that typically extend to depths of approximately 10 to 30 feet below the surface. The Caloosahatchee Marl underlies the surficial sands and consists of sandy shell marl that extends to a depth of 70 feet below the surface. The Hawthorn Formation, which consists of sandy limestone and clays, underlies the Caloosahatchee Marl and is the regional confining unit for the Floridan aquifer. This formation is generally 80 to 120 feet thick, typically extending to a depth of approximately 180 feet below the surface. Beneath the Hawthorn Formation lie the limestone formations of the Floridan Aquifer, which extend several thousand feet below the surface at CCAFS (USAF 1991).

Prior to and during construction, erosion and sediment control measures such as siltation fences (Best Management Practices) are required to retain sediment on-site and to prevent violations of state water quality standards. While the implementation of these practices is normally performed and required by the state, the absence of them would not create a significant impact.

2.4.1.2 Air Quality

Demolition of the existing ACTC and various programmed land clearing activities would pose a short term increase in the amount of various regulated air pollutants in the immediate area of the Skid Strip. However, these temporary construction and land clearing related fugitive emissions increases would not be significant enough to cause a resulting change to the National Ambient Air Quality Standards (NAAQS) attainment status. It should be noted that CCAFS is in an EPA recognized air "attainment" area; therefore no air conformity determination is required. Particulates and fugitive dust and/or any volatile organic compounds (VOCs) or regulated air toxics from these activities can be adequately controlled through periodic water spraying and other planning activities normally performed during construction projects. Any potential air emissions associated with the existing ACTC demolition, including any removal of asbestos, will be conducted in the same way that current asbestos abatement is conducted elsewhere on CCAFS in order to protect construction workers and other station personnel. It is assumed that the present amount of disturbed acres contained in the current Title V Air Operating permit will not be exceeded as a result of these projects, and if it is determined that they would be potentially exceeded (i.e. yearly totals of disturbed acres and associated particulate emissions generated from that type activity station wide), then those impacts would be addressed at that time and a modification would be proposed to the existing Air Operating Permit for CCAFS. It is assumed that temporary increases in vehicle traffic, land clearing, other light duty and heavy duty construction and land clearing related equipment would be insignificant and would not adversely impact the existing NAAQS standards for CCAFS and the surrounding area.

2.4.1.3 Hazardous Materials and Hazardous Waste

The current flight operations building and tower most likely contain asbestos and/or lead based paint (LBP) in various forms. Limited asbestos sampling and analysis was conducted within the ATCT. Miscellaneous materials consisting of caulk and mastic (carpet adhesive) were identified as containing asbestos fibers in excess of one percent. These materials were reported to be non-friable. A site-specific asbestos and/or LBP survey will be necessary prior to any renovation or demolition activities where regulated asbestos containing material (RACM) or LBP may be present. As necessary, regulatory required plans will be developed and personnel would have the mandatory training and certifications/registrations. Appropriate abatement activities and disposal requirements would be followed.

All notifications to FDEP would be completed and approved prior to initiation of any abatement activities, and any associated permits would be obtained to comply with federal, state, and local regulations. Identification, sampling, analysis, management, use, storage, or disposal of resulting hazardous materials would be consistent with the existing USAF instructions.

Implementation of the Proposed Action may require or generate small quantities of hazardous materials or wastes. All waste generated by the construction contractor must be managed in accordance with all Federal, State, local and Installation regulations and directives. The contractor will assume all liability for improper waste disposal. The responsibility for off-site disposal of solid non-hazardous waste also lies with the contractor. Management of hazardous waste must be completed in accordance with 40 CFR 260-279. All USAF hazardous waste (if any) is to remain on the Installation and will be shipped off-site by the USAF under their EPA identification number.

2.4.1.4 Infrastructure and Transportation

Minor short-term interruptions to traffic flow or utilities may occur during construction activities. Slight increased requirements for drinking water, wastewater, and power are anticipated. Communication lines have already been established to the existing facilities. Stormwater drainage and ingress/egress road improvements would be anticipated from the Proposed Action.

The USAF supports the recycling of construction and demolition materials to the largest extent possible. However, if the building contractor is directed to dispose of construction and demolition and/or asbestos containing materials in the CCAFS landfill, all requirements specified in the CCAFS Landfill Operations Plan must be met including the completion of the “Landfill Disposal Verification Form”. For off-site disposal activities, all materials must be secured to prevent safety hazards during transport.

2.4.1.5 Health and Safety

Common safety hazards associated with heavy equipment operation and construction activities would exist. All appropriate regulations, including Occupational Safety and Health Administration (OSHA) Regulation 29 CFR 1926, *Safety and Health Regulations for Construction*, would be followed during project activities to minimize potential minor impacts. Notable positive impacts to safety and health would be anticipated from the Proposed Action by eliminating the need for safety waivers.

2.4.1.6 Noise

Low to moderate levels of noise would be generated by heavy equipment, vehicles, and other construction equipment during operations. The decibel (dB) is the accepted standard unit for measuring the level of noise and is generally adjusted to the “A-weighted” logarithmic scale (dBA) to better correspond to the normal human response to different frequencies. Several metrics have been developed for multiple-noise event analysis. The one most commonly used is the LDN (Day – Night Average Sound Level) metric. This is the dBA level averaged over a 24-hour period, with an additional ten-dBA penalty added for noise events occurring between 10 p.m. and 7 a.m. (because noise at night is judged to be more annoying than noise during the day). The threshold

noise level for compatible land uses is an LDN of 65 dBA. Areas outside (less than) the 65 dBA LDN contour are compatible with residential and other noise-sensitive land uses. Vehicles associated with the Proposed Action typically have a dBA between 65 and 100, at a distance of 50 feet (USEPA, 1971). No impacts would be anticipated since all work activities of the Proposed Action would be confined to daylight hours to avoid nuisance noise in the evenings.

Normal use of personal hearing protection devices during the operation of equipment and construction activities will be required as standard operating procedures. Noise abatement devices on equipment and vehicles further minimize the potential for negative effects from noise to personnel and wildlife. It is anticipated that the moderate level of noise generated from construction activities would act as a warning mechanism for wildlife within the construction site, and should help minimize impacts to animals inhabiting land affected by the Proposed Action.

The relative isolation of the Airfield reduces the potential for noise to affect adjacent communities. The closest residential areas to CCAFS are to the south, in the cities of Cape Canaveral and Cocoa Beach. Expected sound levels in these areas are normally low, with higher levels occurring in industrial areas (Port Canaveral) and along transportation corridors reaching levels of 60 to 80 dBA. Residential areas and resorts along the beach would expect to have low overall noise levels, normally about 45 to 55 dBA. Increased air traffic at the Airfield would potentially increase noise levels for short periods, but these impacts would not be an issue of significant or long term concern on CCAFS.

2.4.1.7 Land Use and Zoning

The USAF, as a federal landowner, is obligated to act responsibly and effectively in the use of natural resources under their control. The Proposed Action is compatible with the mission of the 45th SW and various federal and state acts that require protection of human health and the environment and no impacts would be anticipated.

2.4.1.8 Socioeconomics

Slight positive impacts would be expected to local socioeconomic conditions due to an increase in work associated with facility construction/improvements and operation activities and local purchases of construction materials. However, this impact would be negligible.

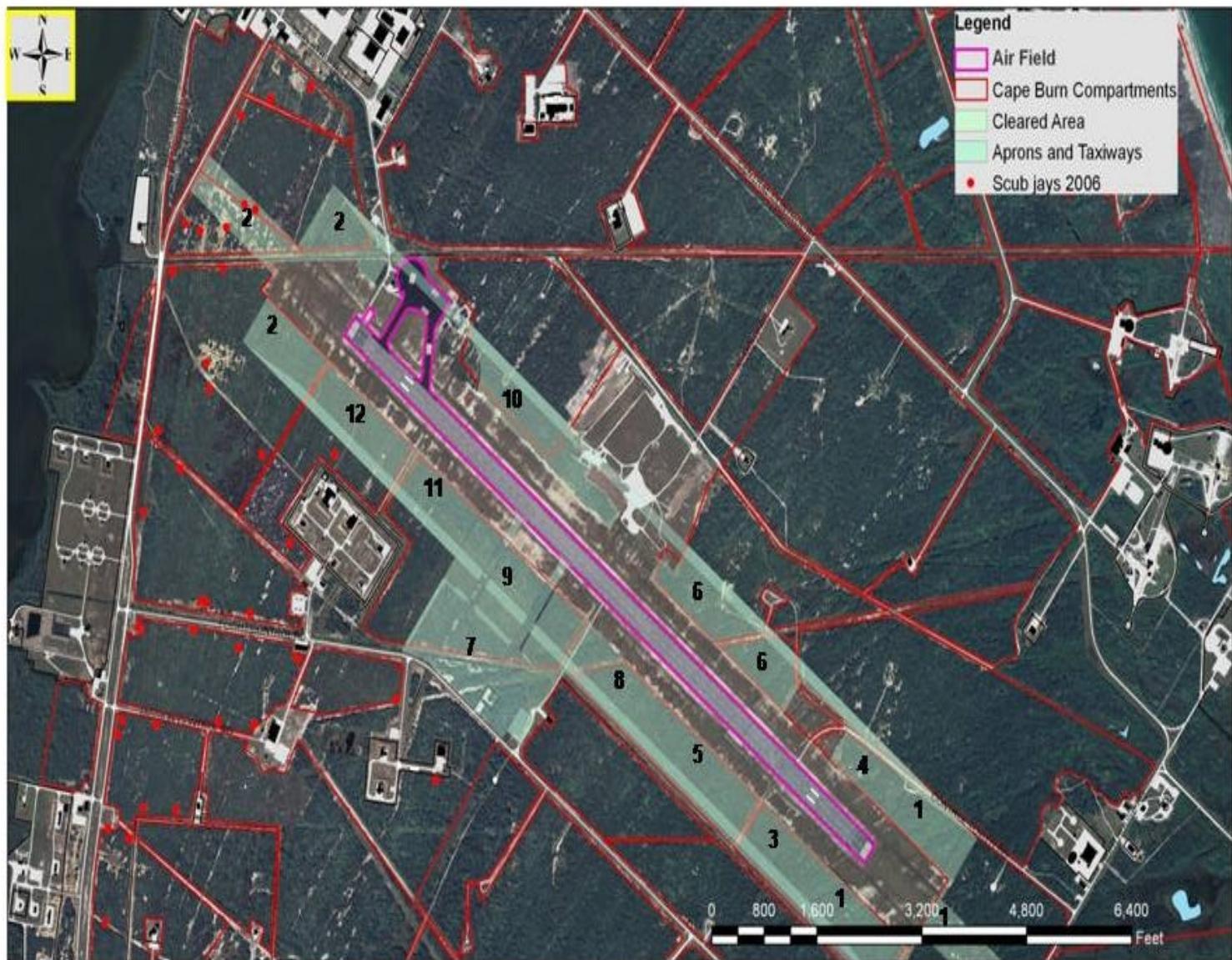


FIGURE 2-5 PROPOSED CLEAR AREAS



Environmental Assessment for Skid Strip
Projects
Cape Canaveral Air Force Station
Cape Canaveral, Florida

DRAWN BY: JPK

REFERENCE: Provided
by CCAFS

3.0 AFFECTED ENVIRONMENT

This section describes the existing environments at CCAFS and their ROI. The primary ROI for this section is the area in and around the Airfield. This information serves as a baseline from which to identify and evaluate environmental changes resulting from the implementation of the Proposed Action. The resources and conditions discussed in this section include: biological, cultural, and water resources.

3.1 BIOLOGICAL RESOURCES

The USAF, particularly the 45th SW, is committed to the long-term management of all natural areas on its installations, as directed by Air Force Instruction (AFI) 32-7064, Integrated Natural Resources Management. Long-term management objectives are identified in the 45th SW's 2001 Integrated Natural Resources Management Plan (INRMP) with specific land management objectives identified in the Scrub-Jay and Sea Turtle Management Plans located in the appendices of the INRMP. The following information was derived from several sources, including the 2001 INRMP. Additionally, recent information has been included from a Biological Assessment (BA) which was written by the 45th SW and completed in January 2008. The BA was completed after the 45th SW determined that the proposed action may affect federally listed species. As a result of this BA, the USFWS issued a Biological Opinion (BO) to address impacts to listed species (Section 4).

This section describes the existing vegetation, threatened and endangered species, and species of special concern that occur or could potentially occur at and around the perimeter of the Airfield at CCAFS, and could be affected by construction activities. Biological resources include native or naturalized plants and animals, as well as the habitats in which they exist. Sensitive and protected biological resources are plant and animal species listed as threatened or endangered by the USFWS and the Fish and Wildlife Conservation Commission (FWCC).

3.1.1 Vegetation

3.1.1.1 Invasive Species

Most of the areas on CCAFS that are disturbed, including roads, utility corridors, launch complexes, and areas around the Skid Strip have a healthy invasive species component. Brazilian pepper (*Schinus terebinthifolius*) predominates the invasive flora at CCAFS with six other invasive weeds present in lower densities; the most wide spread of these is Australian pine (*Casuarina equisetifolia*). Australian pine trees grow singly or as small, dense groves scattered across the base. In addition, cogon grass (*Imperata cylindrica*), melaleuca (*Melaleuca quinquenervia*), mistletoe (*Phoradendron serotinum*), and small populations of thistles (*Cirsium* spp.) and nettles (*Urtica* spp.) are present (Invasive Plant Species Control Plan for CCAFS, 2004).

3.1.1.2 Native Vegetation Communities

At least 10 high-quality natural communities of vegetation exist on CCAFS, despite the communities being fragmented by mission-related construction and clearing activities. Parallel to the coastline, CCAFS has a series of ridges and swales that support these communities. These communities include the oak scrub, rosemary scrub, maritime hammock, coastal strand, coastal dunes, grasslands, seagrasses, hydric hammock, interdunal swales, and estuarine tidal swamps and marshes. Vegetation on CCAFS consists mainly of the indigenous Florida coastal scrub (including oak and rosemary scrub) and xeric and maritime hammocks. These scrub habitats also contain the Brazilian pepper, a non-native aggressive plant, which invades these communities along disturbed areas, and then becomes established as it out competes native species.

The proposed action area is located around the perimeter of the Airfield located in the central portion of CCAFS. Regularly mowed and maintained grasses are currently found around the perimeter of the Airfield, approximately 500 feet from the centerline of the runway. The remaining vegetation beyond this is forested and categorized as coastal/oak scrub. Scrub oaks are the dominant species with a closely associated shrub layer of saw palmetto (*Serenoa repens*). Along the southeastern side of the Airfield, coastal strand indicator species such as wax myrtle (*Myrica cerifera*), nakedwood (*Myrsianthes fragrans*) and tough buckthorn (*Bumelia tenax*) are found in higher densities. These identified community types have joined and developed into a closed canopy, maximized height forest generally categorized as xeric hammock. Historically, xeric hammocks were areas of natural fire breaks limiting fire spread; however, 50 years of fire suppression at CCAFS has created this expansive hammock scrub.

The coastal/oak scrub mix around the Airfield is defined by oaks that appear to be at or close to their maximum height of 25 feet to 30 feet. Tree-sized cabbage palms (*Sabal palmetto*) and red bays (*Persea borbonia*) are interspersed with shrubby saw palmetto, wax myrtle, tough buckthorn, nakedwood and rusty lyonia (*Lyonia ferruginea*). The coastal/oak scrub is dominated by live oak (*Quercus virginiana*). Myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminata*) and chapman oak (*Quercus chapmannii*) are also found interspersed around the Airfield. Large bays are within the forest along the north, northeast, east, south and southwest sides of the Airfield, adding to the hammock structure. Grape vine (*Vitis rotundifolia*) is atop the canopy and within openings in several areas surrounding the Airfield. Many different vascular species are in the understory, such as saw palmetto, rusty lyonia, tough buckthorn, wax myrtle, nakedwood, tallow wood (*Ximenia americana*) and beautywood (*Callicarpa americana*).

In areas categorized as disturbed coastal oak/scrub, there are some scattered sandy openings dotted with several small shrubby and herbaceous species such as sand cordgrass (*Spartina bakerii*), gopher apple (*Licania michauxii*), prickly pear cactus (*Opuntia humifusa*), partridge pea (*Galactia elliottii*), milkwort (*Polygala* sp.), blueberry (*Vaccinium* sp.), hempvine (*Mikania scandens*), and Madagascar periwinkle

(*Catharanthus roseus*). Brazilian pepper (*Schinus terebinthifolius*) is also found along the edges of the maintained grassy areas, the lines of sight, and roadways within the clear zone. All areas surrounding the Airfield, excluding treated scrub and some disturbed areas, range from 5 feet to 30 feet in height. Disturbed coastal/oak scrub height in the clear zone generally ranges from 5 feet to 20 feet. The extreme western edge of the Airfield is the only area that has undergone scrub restoration treatment. The canopy of these areas is low in stature, averaging approximately 5 feet to 15 feet.

3.1.2 Wildlife and Migratory Birds

This section provides information on wildlife and migratory birds that inhabit areas in and around the CCAFS Airfield.

3.1.2.1 Migratory Birds

At CCAFS, resident and migrating bird species include numerous common land and shore birds. Cape Canaveral is situated along a major flyway route for migratory birds and therefore home to numerous birds listed on the USFWS migratory bird list, all of which are protected at the Federal level by the Migratory Bird Treaty Act (MBTA). All but a few bird species (i.e. pigeons, European starlings, etc.) found on CCAFS are on this list. Multiple species of birds, such as mockingbirds, grackles and great horned owls, have been documented nesting around the Airfield. Executive Order 13186, signed in 2001, requires federal agencies to protect migratory birds and their habitats. This would require that the nest be empty of eggs or young prior to relocation or removal. CCAFS also supports a large population of ospreys. They are most often found near water, nesting near the top of large trees, bore-sight towers, utility poles, antennas and gantries. The osprey is federally protected by the MBTA, which makes it illegal to destroy a nest without the proper permits. At this time, ospreys appear to be nesting on the pole next to the control tower as well as on the parking apron lights.

3.1.2.2 Wildlife

The coastal scrub and associated woodlands provide habitat for mammals including the white-tailed deer, armadillo, bobcat, feral hog, raccoon, long-tailed weasel, round-tailed muskrat, and the Florida mouse (a State species of special concern).

Amphibians observed at CCAFS include the spade foot and eastern narrow-mouth toads, squirrel and southern leopard frogs, and green tree frogs. Reptiles observed include the American alligator, the Florida box turtle, the gopher tortoise, the Florida softshell, the green anole, the six-lined racerunner, the broadhead skink, the southern ringneck snake, everglades racer, the eastern coachwhip, and the mangrove salt marsh snake.

Numerous marine mammals populate the coastal and lagoon waters including the bottlenose dolphin, the spotted dolphin, and the manatee. The seagrass beds in the northern Indian River system provide important nursery areas, shelter, and foraging

habitat for a wide variety of fish and invertebrates, and for manatees. The inland rivers and lagoons provide habitat for marine worms, mollusks and crustaceans. The Mosquito Lagoon is an important shrimp nursery area.

A number of saltwater fish species can be found within Indian and Banana River Systems including the bay anchovy, pipefish, goby, silver perch, lined sole, spotted sea trout, and oyster fish. The small freshwater habitats found on CCAFS contain bluegill, garfish, largemouth bass, killifishes, sailfin molly, and top minnow (USAF, 1998).

3.1.3 Threatened and Endangered (T&E) Species

Cape Canaveral Air Force Station contains habitat utilized by a large number of federal and state-listed species. Listed species that are known to be present on or near the Airfield are presented in **Table 3-1**. This section presents the federal and state regulatory requirements for vegetation and wildlife. It also identifies the federal and state-listed species that may be present on and in the vicinity of the Airfield.

Table 3-1
Threatened and Endangered Species of Flora and Fauna Found on
and in the Vicinity of the Airfield at CCAFS

Common Name	Scientific Name	Status	
		Federal	State
Plants			
Beach Star	<i>Remirea maritime</i>	----	E
Coastal Vervain	<i>Verbena maritime</i>	----	E
Curtiss' Milkweed	<i>Asclepias curtissii</i>	----	E
Giant Leather Fern	<i>Acrostichum danaeifolium</i>	----	CE
Golden Polypody	<i>Phlebodium aurea</i>	----	T
Hand Fern	<i>Ophioglossum palmatum</i>	----	E
Nodding Pinweed	<i>Lechea cernua</i>	----	T
Satin Leaf	<i>Chrysophyllum olivaeforme</i>	----	E
Birds			
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	DM	E
Bald Eagle	<i>Haliaeetus leucocephalus</i>	DM	T
Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	T	T
Least Tern	<i>Sterna antillarum</i>	----	T
Piping Plover	<i>Charadrius melanotos</i>	T	T
S.E. American Kestrel	<i>Falco sparverius paulus</i>	----	T
Wood Stork	<i>Mycteria americana</i>	E	E
Reptiles and Amphibians			
Atlantic Green Turtle	<i>Chelonia mydas</i>	E	E
Atlantic Hawksbill Sea Turtle	<i>Eretmochelys imbricata imbricata</i>	E	E
Atlantic Loggerhead Turtle	<i>Caretta caretta</i>	T	T
American Alligator	<i>Alligator mississippiensis</i>	T	SSC

Common Name	Scientific Name	Status	
		Federal	State
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	T
Gopher Frog	<i>Rana capito</i>	----	SSC
Gopher Tortoise	<i>Gopherus polyphemus</i>	----	T
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempi</i>	E	E
Leatherback Turtle	<i>Dermochelys coriacea</i>	E	E
Mammals			
Florida Manatee	<i>Trichechus manatus</i>	E	E
Southeastern Beach Mouse	<i>Peromyscus polionotus niveiventralis</i>	T	T

CE – Commercially Exploited

E – Endangered

SSC – Species of Special Concern

S/A – Similar in Appearance

T – Threatened

DM – De-listed: Recovered

---- No Listing Status

Federal Regulatory Requirements

Endangered Species Act (ESA). The ESA provides for the conservation of ecosystems upon which threatened and endangered species of wildlife and plants depend, both through Federal action and by encouraging the establishment of State programs. Section 7 of the ESA requires Federal agencies to ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of the listed species or modify their critical habitat.

Migratory Bird Treaty Act. Under this Act, taking, killing, or possessing migratory birds is unlawful.

Bald and Golden Eagle Protection Act. This Act prohibits the taking or possession of, and commerce in, bald and golden eagles.

State Regulatory Requirements

Florida Endangered and Threatened Species Act. This Act includes no specific prohibitions or penalties, but does establish the conservation and wise management of endangered and threatened species as State policy.

Endangered Species Protection Act. This Act prohibits the intentional wounding or killing of any fish or wildlife species designated by the FWCC as "endangered", "threatened" or of "special concern". This prohibition also extends to the intentional destruction of the nests of any such species.

3.1.3.1 Florida Scrub-Jay

The Florida scrub-jay (*Aphelocoma coerulescens*) is a federally threatened bird endemic to open, oak-dominated scrub habitats of Florida. Widespread destruction and degradation of scrub habitat over the last century has resulted in dramatic declines in

the distribution and abundance of this species. Because the scrub-jay is intimately tied to open, oak-dominated scrub, conservation of the species depends upon restoration of sufficient optimal habitat to support large populations. The scrub-jay population on CCAFS figures prominently in recovery plans for the species. Believed to be one of the largest remaining populations, the CCAFS population has been designated as belonging to one of three core populations for the species.

The USAF contracts with Florida Natural Areas Inventory, Florida State University, to study the demography of Florida scrub-jays on CCAFS. All suitable accessible jay habitat is surveyed on a yearly basis between January and March. Nesting activity is monitored from February to July of each year. The 2007 census resulted in 126 groups with a total of 391 birds, which is an increase from 120 groups and 317 birds in 2006.

Management actions for scrub-jays on CCAFS are primarily oriented toward habitat improvement. Since the majority of CCAFS is or could be scrub-jay habitat, land clearing activities have the potential to adversely impact scrub-jays and their habitat. The USFWS has designated CCAFS as part of a core scrub-jay area, indicating that all scrub habitat on CCAFS is highly valuable to the recovery of the species. Consultations between the USFWS and the USAF led to the development of a *Scrub-Jay Management Plan* for CCAFS in 1991. A *Scrub Habitat Restoration Plan* was developed subsequent to the management plan, and provides a strategy for restoring the scrub habitat needed by this federally threatened species on CCAFS. The objective of scrub habitat restoration on CCAFS is to restore the over-mature scrub to a condition suitable to support the Florida scrub-jay. The main methods used for habitat restoration are mechanical treatment and prescribed burning of mechanically treated sites. Mechanical treatment reduces the height of the scrub. Prescribed burning provides open areas of sand and prevents the accumulation of fuels. Currently, the USAF uses prescribed fires in most of the potential scrub-jay habitat.

The Proposed Action site is located around the perimeter of the Airfield. The extreme western edge of the Airfield is the only area that has undergone scrub restoration treatment. The following describes the treatment that has been accomplished in each compartment.

- LMU38 – Cut and burned in 1999
- LMU39 – Cut and burned in 1999
- LMU66 – Cut and partially burned in 2005
- LMU48 – Cut and partially burned in 2005
- LMU49 – Cut and burned in 1999

Breeding surveys conducted between 1999 and 2007 document the continuous presence of scrub-jays in this treated area (LMU38, 39, 48, 49). Currently, these are the only compartments impacted by the proposed clearing where scrub-jays are present. Figure 3-1 includes the locations of scrub-jay groups observed during the 2006 census (2007 point data was not available). During the 2006 census, five groups totaling 12 individuals were documented within this area.



FIGURE 3-1 Scrub-Jay Group Locations

3.1.3.2 Southeastern Beach Mouse

The southeastern beach mouse (*Peromyscus polionotus niveiventralis*) is a subspecies of the widely distributed beach mouse (*P. polionotus*). Originally occurring on coastal dunes and coastal strand communities along the Atlantic coast of Florida, this beach mouse generally occurs along the primary dune line for a distance of approximately 24 kilometers. It is presently known to exist in six sites in Brevard, Indian River, and St. Lucie Counties. Trapping has shown the beach mouse to be present in a discontinuous pattern (J. Stout, personal communication). Most breeding activity occurs November through January, and females can produce two or more litters per year, with litters averaging three to four (USFWS 1988).

On CCAFS, the mice occur from the coastal dunes inland to the west side of Samuel C. Phillips Parkway, and are generally found where the sand is suitable for burrows, coastal scrub is present, and the water table is not close to the surface. While inland populations may be more stable, their abundance varies from site to site inland of the dune system. However, nearly every coastal scrub site surveyed on CCAFS supports the beach mouse.

Although the entire Proposed Action site has not been surveyed or trapped, visual surveys were conducted in habitat that has shown to support beach mice in other areas on CCAFS. The majority of the area around the Airfield is extremely overgrown and not likely to support beach mice; however, in the area of treated scrub, small mammal burrows have been observed. Trapping conducted in similar habitat 0.5 miles to the south resulted in the capture of 177 beach mice.

3.1.3.3 Eastern Indigo Snake

The longest of North American snakes (up to 8.6 ft), the eastern indigo snake (*Drymarchon corais couperi*) is locally abundant in parts of Florida, but as a top carnivore, population densities are typically low. The eastern indigo snake has been found on CCAFS and likely occurs throughout the station. This primarily diurnal snake is known to occur in most types of habitat and is often associated with gopher tortoise burrows, although this has never been observed on CCAFS. The reproductive season encompasses copulation (November through April), egg laying (May through June), and hatching (late July through October). Home ranges for male indigo snakes range from 191 to 360 acres and female home ranges vary between 14 and 130 acres. Major threats to the indigo snake on CCAFS are habitat loss and vehicle traffic. There has not been an installation wide census completed for indigo snakes; however, based on the different habitat types around the Airfield, it is likely to occur within the areas to be cleared.

3.1.3.4 Marine Turtles

Three species of federally protected sea turtles have been documented as nesting on CCAFS: the loggerhead (*Caretta caretta*), green (*Chelona mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. Based on nest surveys from 1986-2007, the average number of loggerhead and green nests deposited annually is 2,245 and 49, respectively. Thirty-nine leatherback nests have been documented since surveys began in 1986.

While sea turtles spend much of their lives in the ocean, females come ashore each year to nest. Research has shown that females will avoid highly illuminated beaches and postpone nesting. Artificial lights have also resulted in hatchling mortality as disoriented hatchlings move toward these light sources rather than the ocean.

In 1988, in compliance with Section 7 of the ESA, the USAF developed Light Management Plans (LMPs) for various areas and facilities on CCAFS to protect sea turtles. A BO issued by the USFWS requires that LMPs be developed for all new facilities that are in close proximity to the beach, are not compliant with wing lighting policies, have lighting directly visible from the beach, and/or may cause significant sky glow. In addition, USAF biologists conduct nighttime inspections to ensure all exterior lighting is being operated in accordance with policies. The BO authorizes no more than 3% incidental take of turtles as the result of disorientation on CCAFS. In 2007, the

incidental take reported to USFWS was 2.5%. The Airfield was not responsible for any of the reported disorientation incidents.

3.1.3.5 Gopher Tortoise

The gopher tortoise is listed as a threatened species in the state of Florida, and is federally-listed in several other regions of the U.S. Gopher tortoises inhabit upland habitats common in central Florida, including scrub, pine flatwoods, and the dune area along beaches. Their diet consists mainly of grasses, grass-like plants, and legumes. It is illegal to take, harm or harass this species. Likewise, the destruction of gopher tortoise burrows constitutes a “take” under this law except as authorized by specific permit. Although the gopher tortoise is not federally protected in Florida, it is afforded protection by the USAF due to its state ranking and the commensurable use of its burrow by other Federally protected species. The area around the Skid Strip is known to be habitat for gopher tortoises.

3.1.4 Wetlands and Floodplains

There are four man-made “ditches” or swales that drain the runway and direct adjacent land; these four then lead to two man-made ditches that intersect the Skid Strip Airfield. One of the ditches is on the west end and drains surface run-off to the north and south and then eventually to the Banana River to the west. The US Army Corps of Engineers (USACE) indicated that this drainage ditch would be jurisdictional wetland due to its connection to Banana River. The ditch on the east end drains surface water to the south. This drainage ditch is considered to be an upland cut and not jurisdictional wetland under the CWA per discussions with the SJRWMD and with the USACE (USACE Site Meeting, 27 Feb 2007). The eastern ditch is usually dry and does not contain typical wetland vegetation. Parts of the western ditch contain water but the length of the ditch nearest to the skid strip is not considered quality wetlands. The four swales are not considered wetlands.

Floodplains are lowland and relatively flat areas adjoining inland and coastal waters that are subject to flooding. Both the 100-year and the 500-year floodplains are located beyond the boundary of the planned expanded area of the new Airfield perimeter.

3.2 CULTURAL RESOURCES

Cultural resources include prehistoric and historic sites, structures, districts, artifacts or any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious or any other reasons. For ease of discussion, cultural resources have been divided into archaeological resources (prehistoric and historic), historic buildings and structures, and Traditional Cultural Properties (e.g., Native American sacred or ceremonial sites). Also to be considered in any discussion of related resources, is the presence of paleontological sites at CCAFS.

3.2.1 Archeological Resources

Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the action and prescribe the relationship among other involved agencies (e.g., the State Historic Preservation Officer [SHPO], Tribal Historic Preservation Officers [THPOs], and the Advisory Council on Historic Preservation). In addition to NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are Sections 106 and 110 of the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA) (1979), the American Indian Religious Freedom Act (AIRFA) (1978), and the Native American Graves Protection and Repatriation Act (NAGPRA) (1990).

Only those cultural resources determined to be significant or potentially significant under the above-cited legislation are subject to protection from adverse impacts resulting from an undertaking. To be considered significant, a cultural resource must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion in the National Register of Historic Places (NRHP). The term "eligible for inclusion in the National Register" includes all properties that meet the NRHP listing criteria, which are specified in the Department of the Interior regulations Title 36 CFR 60.4 and NRHP Bulletin 15. Whether prehistoric, historic, or traditional, significant cultural resources are referred to as "historic properties."

Data suggests human first occupied Florida as early as 15,000 years ago. However, archaeological investigations at CCAFS indicate that human occupation of the area first occurred at least 5,000 years ago. Prehistoric occupation periods of CCAFS are: Archaic Period (divided into early, middle, late subperiods), Mt. Taylor Period, the Orange Period, and the Malabar I and II Periods. Early settlement was focused within the Banana River Lagoon salt marsh area; however, there is archaeological evidence that the entire peninsula was exploited for a wide variety of marine, estuarine and terrestrial resources. At the time of European colonization, the Cape Canaveral and Banana River areas were populated by tribal groups of the Ais Indian tribe. Based on Spanish accounts the Ais were a non-agricultural chiefdom who continued a hunter-fisher-gatherer subsistence pattern more than unlikely unchanged from the end of the Late Archaic Period.

Prehistoric archaeological sites within CCAFS are typically middens and mounds. A midden is a refuse deposit resulting from human activities, generally consisting of soil, food remains (bone and shell), and discarded artifacts. At CCAFS there are two types of middens. A black earth or sheet midden is, as the name implies identifiable by the presence of black organic soils. They tend to be linear and can range in size from a few meters to a kilometer (or more) in size. A shell midden (or shell mound) is a mound-like deposit of shell. At CCAFS both were used as living floors and may contain human remains. A mound can be just soil or a combination of shell and soil. They typically

were used for interment of the dead, ceremonial centers, or as the home of high status individuals. Other prehistoric archaeological sites at CCAFS include isolated finds or small clusters containing a few artifacts.

Historic occupation periods of CCAFS are: First Spanish (1513-1763), British (1763-1783), Second Spanish (1783-1821), American Territorial (1821-1842), Early Statehood (1842-1861), Civil War (1861-1865), Reconstruction and Late Nineteenth Century (1865-1899), and Twentieth Century (1900+). The first Spanish explorers were known to have visited the CCAFS area sometime around 1513 when Ponce de Leon recorded he was attacked by the Ais. Over the years there were periodic encounters with the Ais and there were treaties made between the Ais and Spanish. In 1605 Alvaro Mexia made the first detailed exploration of the area. One of the most famous accounts of the Ais was the journal kept by an English shipwreck survivor named Jonathan Dickinson. The area was subjected to slave raids and diseases depopulated the region with the death of the last of the Ais recorded in 1783 in Cuba. The CCAFS area remained essentially devoid of human occupation until American Territorial Period when the Seminole Indians were known to occupy Central Florida and Douglas Dummett homesteaded lands north of what is now Kennedy Space Center. The earliest documented continuous human occupation of CCAFS was in the mid-1840s when veterans of the Seminole Indian Wars were granted land patents for their service in the wars. In 1844, the first lighthouse was established on what is now CCAFS. The population remained low until after the Civil War. During the years following the Civil War displaced southerners, former slaves, and veterans from the north moved to Florida to begin a new life. CCAFS remained somewhat isolated until well into the 1880s and was accessible only by boat. In the early 1900s roads were constructed which opened CCAFS to more people and by the time of the Florida Land Boom in the 1920s small communities were springing up on the island. This ended with the start of the Great Depression and remained after World War II.

Historic archaeological sites on CCAFS tend to be homestead/farmstead sites, small surface scatters, small house sites, linear resources such as former unpaved roads or trails, and cemeteries. Most tend to be Twentieth Century in origin and not NRHP eligible.

3.2.2 Historic Facilities and Structures

In 1949, the Cape Canaveral Long-Range Proving Ground was formally established under the direction of the Air Force. Construction of the first missile launch pads, support facilities, and down-range tracking stations began in 1950, and throughout that decade military facilities and activities developed at a rapid pace. Various cruise-type missiles were tested during these years and the installation began to support the Intermediate Range Ballistic Missile (IRBM) and Intercontinental Ballistic Missile (ICBM) programs. Activity at the installation peaked in 1966 with more than 30 operational launch complexes.

Historic building and structure surveys at CCAFS include those conducted by the National Park Service (1980); Resource Analysts, Inc. of Bloomington, Indiana (Barton

et al. 1983); and the USACE Construction Engineering Research Laboratories (CERL) (McCarthy et al. 1994; Turner et al. 1994).

A National Historic Landmark district was established in the 1980s and consists of those launch complexes directly associated with the manned space program. Several other launch complexes and associated facilities are eligible for inclusion in the NRHP due to their association with the Cold War ICBM and IRBM programs or due to unique architecture style or engineering/construction methods. CCAFS also owns the Cape Canaveral Lighthouse, one of the oldest standing structures in Brevard County and is also eligible for inclusion in the NRHP.

3.2.3 Traditional Cultural Properties

Significant traditional cultural properties (TCPs) are subject to the same regulations as other types of historic properties and are afforded the same protection. Traditional resources associated with the Ais could include archaeological sites, burial sites, mounds, ceremonial areas, caves, hillocks, water sources, plant habitat or gathering areas, or any other natural area important to this culture for religious or heritage reasons. By their nature, traditional resource sites often overlap with (or are components of) archaeological sites. As such, the National Register listed or eligible sites (as well as any archaeologically sensitive areas) could also be considered traditional sites or could contain traditional resource elements. There are no remaining Ais Indians. They are represented by the Seminole and Miccosukee Tribes of Indians of Florida. While burial sites are sacred sites they are have not been declared TCPs on CCAFS but are afforded protection under NAGPRA and ARPA. There are no TCPs on CCAFS property.

3.2.4 Paleontological Sites

Paleontology is the study of fossils; what fossils tell us about the ecologies of the past, about evolution, and about our place, as humans, in the world. The major laws protecting fossils on federal lands are the Federal Land Policy and Management Act (1976) and NEPA and various sections of Part 43 of the Code of Federal Regulations. No paleontological sites have been documented on CCAFS. However, several fossil sites have been documented within five miles of the CCAFS boundaries. Fossil sites in this region of Florida tend to be deeply buried (12-18 ft below ground surface on average) linear deposits of accumulated bone dating to the Pleistocene.

3.3 WATER RESOURCES

Water resources include groundwater and surface water, and their physical, chemical, and biological characteristics. This section addresses the physical and chemical factors that influence water quality and surface runoff.

The federal CWA established the basic structure for regulating discharges of pollutants

into the Waters of the U.S. and is the primary law regulating water pollution. It gave USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued to set requirements for water quality standards for all contaminants in surface waters. It made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. The FDEP issues NPDES industrial storm water permits, storm water construction permits, and wastewater construction permits. The SJRWMD issues the applicable Environmental Resource Permits (ERP).

Treated water discharged to surface water or into the ocean is subject to the requirements of the NPDES permit, which ensures that the water discharged meets water quality standards at the point of discharge. In addition, projects disturbing one acre or more are subject to NPDES permit requirements for storm water discharges during construction. This permit requires the preparation of a Storm Water Pollution Prevention Plan (SWPPP). Section 319 of the CWA requires states to assess nonpoint water pollution problems and to develop nonpoint source pollution management programs to improve water quality. Section 404 of the CWA requires a permit from the USACE in order to locate a structure, excavate, or discharge dredged or fill material into Waters of the United States.

3.3.1 Surface Water

The ROI for surface water is the drainage system/watershed in which the station is located. CCAFS is within the Florida Middle East Coast Basin and situated on a barrier island that separates the Banana River from the Atlantic Ocean. This basin contains three major bodies of water: the Banana River to the immediate west, Mosquito Lagoon to the north, and the Indian River to the west. The Indian River is separated from the Banana River by Merritt Island. All three water bodies are estuarine lagoons, with circulation provided mainly by wind-induced currents (ET 1998). The storm water management system at CCAFS is multibasinal. Because of the relatively flat topography, many man-made canals and ditches have been constructed to facilitate surface water drainage around developed areas (HSW 1999).

Several water bodies in the Florida Middle East Coast Basin have been designated as Outstanding Florida Water (OFW) in FAC 62-3, including most of Mosquito Lagoon of the Banana River, Indian River Aquatic Preserve, Banana River State Aquatic Preserve, Pelican Island National Wildlife Refuge, and Canaveral National Seashore. These water bodies are afforded the highest level of protection, and any compromise of ambient water is prohibited.

The Indian River Lagoon System has also been designated an Estuary of National Significance by the USEPA. Estuaries of National Significance are identified to balance conflicting uses of the nation's estuaries while restoring or maintaining their natural character. The Banana River has been designated a Class III surface water, as described by the CWA. Class III standards are intended to maintain a level of water quality suitable for recreation and the production of fish and wildlife communities. There

are no wild and scenic rivers located on or near CCAFS.

On site, surface water drains west by overland flow via man-made ditch areas and drainage swales to the Banana River. Surface water recharges the groundwater system through infiltration when water collects in the low-lying areas of the site. There are no permanent surface water bodies within the area of the Airfield.

3.3.2 Groundwater

The ROI for groundwater includes the local aquifers that are directly or indirectly used by CCAFS. The SJRWMD issues the ERP, which includes storm water and wetlands management, in coordination with the FDEP and USACE. The USEPA is responsible for management of the NPDES permit process and wastewater discharges.

The surficial and the Floridan aquifer systems underlie CCAFS. The surficial aquifer system, which generally comprised of sand and marl, is under unconfined conditions and is approximately 70 feet thick. The water table in the surficial aquifer is generally a few feet below the ground surface (ET 1998). The surficial aquifer is recharged by infiltration of precipitation through the thin vadose zone. Assuming negligible runoff, the amount of recharge is approximately equal to the amount of precipitation minus the amount returned to the atmosphere through evaporation and transpiration (OBG 2001b). Groundwater in the surficial aquifer at CCAFS generally flows to the west, except along the extreme eastern coast of the peninsula.

A confining unit composed of clays, sands and limestone separates the surficial aquifer from the underlying Floridan aquifer. The confining unit is generally 18 to 120 feet thick. The relatively low hydraulic conductivity of the confining unit restricts the vertical exchange of water between the surficial aquifer and the confined Floridan aquifer. The Floridan aquifer is the primary source of potable water in Central Florida and is composed of several carbonate units with highly permeable zones. The top of the first carbonate unit occurs at a depth of approximately 180 feet below ground surface, and the carbonate units extend to a depth of several hundred feet. Groundwater in the Floridan aquifer at CCAFS is highly mineralized.

The surficial aquifer at the Airfield consists of clastic sediments that contain groundwater primarily under unconfined conditions. Groundwater occurs at depths ranging from about 3.2 to 18.0 ft below land surface (bls). Shallow groundwater movement across the site is west and south under a hydraulic gradient that ranges from 0.001 to 0.003 ft/ft.

3.3.3 Water Supply

Water for CCAFS is acquired from the City of Cocoa's municipal potable water distribution system under a long-term agreement. The City's contract is with the U.S. Government and includes KSC, CCAFS and Patrick Air Force Base (PAFB). A total of 6.5 million gallons per day (MGD) is allocated for all three facilities. Historically, total

consumption of water from the city for all three facilities has averaged 3.7 MGD. CCAFS, in turn, recovers a portion of the cost of water under its contracts with commercial contractors operating on CCAFS.

Water is utilized at CCAFS for both potable and non-potable purposes. Non-potable use includes fire protection, limited irrigation and launch-related consumption. CCAFS recently upgraded the distribution facilities to improve water quality in the potable distribution system. The Airfield buildings obtain their water from this system.

Currently, the City of Cocoa utilizes groundwater from the Floridan aquifer at its well field in eastern Orange County. The city owns and operates a water treatment facility at the same location. For planning purposes, treatment plant capacity is considered to be either the plant's physical treatment capacity or its permitted withdrawal capacity, whichever is smaller. Generally, the treatment capacity exceeds the withdrawal capacity of a given facility. Treatment capacities are based upon the mechanical equipment installed, which typically provides for redundant or back-up reliability.

Groundwater withdrawal amounts are limited by the City's Consumptive Use Permit (CUP), which is issued by the SJRWMD.

4.0 ENVIRONMENTAL CONSEQUENCES

This section discusses the potential environmental consequences or impacts associated with the Proposed Action and the No-Action Alternative. Alternative 1, the implementation of all projects with the exception of the large MILCON construction projects, has not been carried forward. Changes to the natural and human environment that could result from the proposed action were evaluated relative to the existing environmental conditions described in Section 3.0. A major focus of Section 4.0 is to analyze the level of significance associated with project-related environmental impacts and to specifically determine if any of the impacts could be classified as significant.

Eleven broad environmental resource areas were initially considered to provide a context for understanding the potential effects of the Proposed Action and as a basis for assessing the significance of potential impacts. The areas which were reviewed included biological, cultural, and water resources, geology and soils, air quality, hazardous materials and waste, infrastructure and transportation, health and safety, noise, land use and zoning, and socioeconomic. Following a preliminary analysis, it was determined that no impacts or less than significant impacts would be anticipated for all but three of the resource areas, therefore they were not discussed in Section 3 and are not discussed in this section. The three areas carried forward and addressed in this section include biological, cultural, and water resources. A brief overview of the anticipated environmental consequences to the other eight resources as a result of the Proposed Action is presented in Section 2.4.1.

Under NEPA (42 U.S.C. 4321 *et seq.*), significant impacts are those that have the potential to significantly affect the quality of the human environment. Human environment is a comprehensive phrase that includes the natural and physical environments and the relationship of people to those environments (40 CFR Section 1508.14). Whether an alternative significantly affects the quality of the human environment is determined by considering the context in which it will occur along with the intensity of the action (40 CFR Section 1508.27). The context of an action is determined by studying the affected region and locality, and affected interests within both. Significance varies depending on the physical setting of an alternative (40 CFR Section 1508.27). The intensity of an action refers to the severity of the impacts, both regionally and locally, and may be determined by:

- Overall beneficial project effect versus individual adverse effect(s);
- Public health and safety;
- Unique characteristics in the area (i.e., wetlands, parklands, ecologically critical areas, cultural resources, and other similar factors);
- Degree of controversy;
- Degree of unique or unknown risks;
- Precedent-setting effects for future actions;

- Cumulatively significant effects;
- Cultural or historic resources;
- Special-status species or habitats; and/or
- Compliance with federal, state, or local environmental laws.

The level at which an impact is considered significant varies for each environmental resource. Based on the criteria discussed above, a resource-specific definition of what constitutes a significant impact was prepared for each of the 3 resource areas analyzed in this section. This provides the EA reviewer with a basis for determining if a specific program activity will result in no impact, no significant impact, or a significant impact to a specific resource area.

4.1 BIOLOGICAL RESOURCES

Impacts on biological resources would be considered significant if they resulted in harm, harassment, or destruction of special-status species, including any federal or state endangered, threatened, or rare species, or its designated or proposed designated critical habitat, migration corridors, or breeding areas. The loss of a substantial number of individuals of any native plant or animal species that could affect abundance or diversity of that species beyond normal variability is also considered significant.

4.1.1 Vegetation

Proposed Action

Construction activities will necessitate the clearing of native vegetation; however, some invasive species would be removed by this clearing as well which is positive. Areas that would be affected by construction activities and the new clear zone include 410 acres of potential and occupied scrub-jay habitat. All vegetation within this area would be permanently removed, with no opportunity for restoration. Significant impact by loss of habitat and native vegetation will be compensated through the restoration of overgrown scrub-jay habitat located elsewhere on CCAFS.

No Action Alternative

Under the no action alternative, no changes to the native vegetation, invasive species and landscape would occur; therefore, impacts to the native and invasive species is not expected. It is possible that if invasive species were not mechanically removed then they would continue to encroach into native species habitats under the no action alternative.

4.1.2 Wildlife and Migratory Birds

Proposed Action

Construction activities associated with the Proposed Action would occur over eight

years, which would include several breeding seasons for many wildlife species. Wildlife present in the area could be affected by construction noise. Wildlife response to noise can be physiological or behavioral. Physiological responses can range from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Behavioral responses to man-made noise include attraction, tolerance, and aversion. Each has the potential for negative and positive effects, which vary among species and among individuals of a particular species due to temperament, sex, age, and prior experience with noise. Responses to noise are species-specific; therefore, it is not possible to make exact predictions about hearing thresholds of a particular species based on data from another species, even those with similar hearing patterns.

Reptiles and Amphibians

Reptile and amphibian hearing is poorly studied. However, reptiles and amphibians are sensitive to vibrations, which provide information about approaching predators and prey. Vibration and noise associated with construction activities would potentially cause short-term disturbance to amphibians and reptiles. These impacts would be considered short-term and would not cause a significant impact to reptilian and amphibian populations within the vicinity of the project area.

Migratory Birds

Potential impacts to birds resulting from construction and human generated noise include disruption in foraging, roosting, and courtship activities. Biological monitoring during clearing of vegetation would provide the opportunity to mark areas where birds are known to be nesting. These areas could be avoided until birds have fledged from the nest. The MBTA of 1918, as amended (16 USC 703-712), provides federal protection to all migratory avian species, their nests, and unfledged young. Construction activities associated with the Proposed Action would result in short-term noise disturbances, which may temporarily disrupt foraging and roosting activities of individual birds. If the construction occurs during the breeding season for avian species, it has the potential to disrupt breeding activities including courtship, incubation and brooding. These impacts would be considered short-term and would not cause a significant impact to migratory bird populations within the vicinity of the project area. Avian surveys immediately preceding the initiation of construction activities would identify the presence of any nests. Monitoring during construction would identify any potential disturbances so measures could be implemented to avoid adverse effects. Other avian species protected under the MBTA, such as ground nesting birds, have the potential to occur within the project area and vicinity. Avian species present during construction activities would be subject to disturbance that could result in disruption of roosting and foraging activities.

Mammals

Potential noise related impacts to mammalian species during construction activities would include disruption of normal activities due to noise and ground disturbances. These impacts would be short-term and, therefore, would not cause significant impact to mammalian populations within the vicinity of the project area.

No Action Alternative

Under the no action alternative, no changes to the landscape and availability of habitat and nesting areas utilized by wildlife and migratory species would occur. Therefore, no impacts to wildlife and migratory bird species would be expected to occur.

4.1.3 Threatened and Endangered (T&E) Species

Three federally threatened wildlife species (Florida scrub-jay, the Southeastern beach mouse, and the Eastern indigo snake) and one Florida threatened species (Gopher tortoise) occur or have the potential to occur within the project area of the Proposed Action. Potential project related impacts to these species are listed in Table 4-1. Construction activities have the potential to result in the take of some special status wildlife species from activities such as disturbance, excavation, crushing or burial. The USFWS has determined that the proposed action may affect and is likely to adversely affect the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake, but that their continued existence is not likely to be jeopardized if the Air Force employs USFWS mitigation measures.

Table 4-1
Potential Impacts to Federal and State Protected Wildlife Species that Occur or
Have Potential to Occur within the Proposed Action Area

Common Name <i>Scientific Name</i>	Status ¹		Occurrence	Potential Impacts
	USFWS	FWCC		
Eastern Indigo Snake <i>Drymarchon corais couperi</i>	T	T	Potential	Crushing by equipment. Loss of habitat. Disruption due to noise.
Florida Scrub-Jay <i>Aphelocoma coerulescens</i>	T	T	Documented	Loss of breeding habitat. Disruption due to noise.
Southeastern Beach Mouse <i>Peromyscus polionotus niveiventralis</i>	T	T	Documented	Crushing by equipment. Disruption due to noise.
Gopher Tortoise <i>Gopherus polyphemus</i>	----	T	Documented	Crushing by equipment. Disruption due to noise.

T – Threatened

---Not Listed in Florida (but listed as threatened west of the Tombigbee River, Alabama)

4.1.3.1 Florida Scrub-Jay

Proposed Action

Direct Effect

The federally threatened Florida scrub-jay inhabits the Proposed Action site and its vicinity. The proposed action would involve clearing around the Airfield that would result in the loss of 410.83 acres of vegetation as described in Section 2.0 (This includes construction of the apron and parallel taxiway). Clearing of this area would result in the direct permanent loss of approximately 20-acres of scrub-jay habitat occupied by five groups of Florida scrub-jays totaling 12 individual birds. Clearing of this area would also impact a portion of each Florida scrub-jay family's territory in LMU 38, 39, 48, and 49.

Breeding surveys conducted between 1999 and 2007 document the continuous presence of scrub-jays in this treated scrub (LMU38, 39, 48, 49). Currently, these are the only compartments that would be impacted by the proposed clearing where scrub-jays are currently present. A take may occur as the result of loss of habitat. The probability and level of incidental take is dependent upon the number of Florida scrub-jays within the region; their ability to disperse; and the amount and distribution of available suitable habitat. It is possible that as construction proceeds, they will move away from the construction site; however, the USFWS anticipates that "take" will occur. Clearing would be restricted to outside nesting season; therefore, mortality associated with actual clearing activities is not expected to occur. Impacts to the species will be minimized by restoring 1,157.48 acres of potential scrub-jay, southeastern beach mouse and eastern indigo snake habitat at CCAFS over a nine-year period. In accordance with the ESA, the USFWS prepared a BO on this Action in April of 2008 and has issued an "Incidental Take Statement" for this Action.

Indirect Effect

Indirect effects are caused by or result from the Proposed Action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone Section 7 Consultations, but will result from the action under consideration. The indirect effects will occur in two ways: (1) operation of the skid strip will add traffic along roadways adjacent to occupied habitat, possibly resulting in scrub-jays being struck by vehicles or (2) proposed habitat restoration and management activities are expected to enhance scrub-jay dispersal when complete.

Dreschel *et al.* (1990), Fitzpatrick *et al.* (1991), and Mumme *et al.* (2000) provide the best scientific and commercial data on the likelihood of incidental take as the result of scrub-jays being killed by vehicles. The only scientific documentation of road-kill mortality in Florida scrub-jays are from scrub-jays living in a territory immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory.

No-Action Alternative

Under the No-Action Alternative, no changes to the landscape, scrub-jay habitat and nesting behavior would occur. Therefore, it is not expected that the identified scrub-jay population would be affected by the no-action alternative.

Mitigation Measures

Mitigation for direct and indirect impacts to the scrub-jay would compensate for impacts caused by the proposed action. Provided the following mitigation measures are implemented, the proposed action would not significantly impact the scrub-jay population at CCAFS. Reasonable and prudent measures as listed on page 31 of Appendix B are included by reference. The Terms and Conditions listed on page 32 of Appendix B are also included by reference.

The USAF proposes to restore unoccupied scrub-jay habitat at a ratio of 3:1 (every acre lost will require compensation in the amount of four acres). For each phase of clearing around the Airfield, there will be a corresponding project to restore habitat. The proposed areas to be restored will help create two corridors. The first will connect the population of scrub-jays along Phillips Parkway and Pier Road with the population to the north. The second will connect the population along Phillips Parkway to that along Pier Road. A combination of mechanical treatment and prescribed burning will be used to restore habitat. In addition to the creation of habitat, CCAFS will avoid construction in scrub-jay occupied areas during the nesting season from March 1 through June 30; ensure that prior to clearing of scrub-jay habitat there is suitable habitat within 1200 feet; that the USFWS would be notified of any unauthorized taking of scrub-jays identified during construction; and that CCAFS will conduct routine scrub-jay monitoring and submit reports describing the actions taken to implement the terms and conditions of the "Incidental Take Statement".

Appendix B contains an overview of where both clearing and restoration activities will take place. The following describes which units and how many acres in each will be restored.

Phase 1 – 57.27 Acres Cleared – 121.66 Acres Restored

C72 – remaining part of compartment to be restored – 73.34 acres

C89 – entire compartment will be restored – 48.32 acres

Phase 2 – 56.57 Acres Cleared – 157.61 Acres Restored

C40 – entire compartment will be restored – 29.83 acres

C36 – western section of compartment will be restored – 115.94 acres

C37 – eastern portion not previously treated will be restored – 1.34 acres

C38 – eastern portion not previously treated will be restored – 10.5 acres

Phase 3 – 27.07 Acres Cleared – 68.74 Acres Restored

C74 – entire compartment will be restored – 68.74 acres

Phase 4 – 20.61 Acres Cleared – 46.05 Acres Restored

C65 – remaining part of compartment will be restored – 46.05 acres

Phase 5 – 26.3 Acres Cleared – 54.48 Acres Restored

C76 – entire compartment will be restored – 54.48 acres

Phase 6 – 37.94 Acres Cleared – 165.89 Acres Restored

C70 – compartment to be enlarged to include additional acreage not currently included in any compartment; southern portion will be restored – 165.89 Acres

Phase 7 – 37 Acres Cleared – 54.91 Acres Restored

C67 – entire compartment will be restored – 21.97 acres

C78 – compartment will be enlarged to include additional acreage currently not included in any compartment; western portion of compartment will be restored – 32.94 acres

Phase 8 – 26.3 Acres Cleared – 63.75 Acres Restored

C78 – compartment will be enlarged to include additional acreage currently not included in any compartment; remaining portion of compartment not covered in Phase 7 will be restored – 63.75 acres

Phase 9 – 46.68 Acres Cleared – 61.20 Acres Restored

C66 – remaining portion of compartment will be restored – 23.39 acres

C79 – northern portion of compartment will be restored – 37.81 acres

Phase 10 – 32.04 Acres Cleared – 103.98 Acres Restored

C55 – entire compartment will be restored – 88.82 acres

C36 – southeastern portion of compartment will be restored – 15.16 acres

Phase 11 – 18.31 Acres Cleared – 71.06 Acres Restored

C33 – western half of compartment will be restored – 71.06 acres

Phase 12 – 24.74 Acres Cleared – 166.78 Acres Restored

C84 – entire compartment will be restored – 133.50 acres

C48 – remaining portion of compartment will be restored – 33.28 acres

If a dead scrub-jay is found at the project site, it will be salvaged in accordance with proper protocols and notification will be made to the USFWS office in Jacksonville.

4.1.3.2 Southeastern Beach Mouse

Proposed Action

Direct Effect

The proposed action would involve clearing around the Airfield that would result in the loss of 410.83 acres of vegetation. The majority of the area around the Airfield is extremely overgrown and not likely to support beach mice; however, in the area of treated scrub, small mammal burrows have been observed. Trapping conducted in similar habitat 0.5 miles to the south resulted in the capture of 177 beach mice. A take of beach mice is expected to occur as the result of loss of habitat and the destruction of

beach mice burrows from equipment conducting clearing activities. Based on observations made in the field as well as aerial photos of the area, the USAF believes that less than 50 acres proposed to be cleared has the potential to contain habitat that supports beach mice.

The proposed project will permanently impact existing southeastern beach mouse burrows and habitat found within the project area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur. In accordance with Section 7 of the ESA, the USFWS prepared a BO on this Action in April of 2008 and has issued an "Incidental Take Statement" for this Action.

Indirect Effect

Indirect effects are caused by or are a result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone Section 7 Consultations, but will result from the action under consideration. It is expected that indirect effects would result from continued loss of foraging habitat for the southeastern beach mouse.

No-Action Alternative

Under the No-Action Alternative, no changes to the landscape, habitat availability and nesting areas would occur. Therefore, impacts to the beach mouse would not be expected.

Mitigation Measures

Mitigation for direct and indirect impacts to the southeastern beach mouse would offset impacts caused by the proposed action. Provided the following mitigation measures are implemented, the proposed action would not significantly impact the southeastern beach mouse population at CCAFS.

The proposed restoration of habitat for the scrub-jay is expected to be beneficial to southeastern beach mice. Based on a three-year study recently completed for CCAFS, beach mice are benefiting from the same land management activities being conducted for scrub-jays, and the population is expanding into inland locations. Therefore, the potential exists to create an additional 1,000+ acres of habitat for beach mice. Based on observations by USAF biologists of small mammal burrows around the current Airfield clear zone, the expansion of that zone has the potential to provide additional habitat.

If a dead beach mouse is found at the project site, it will be salvaged in accordance with proper protocols and notification will be made to the USFWS office in Jacksonville.

4.1.3.3 Eastern Indigo Snake

Proposed Action

Direct Effect

The proposed action would involve clearing around the Airfield that would result in the loss of 410.83 acres of vegetation. Clearing and construction activities have potential to result in incidental take of some individuals of eastern indigo snake from disturbance and possible mortality during project activities. A take may occur as the result of this habitat loss, although adjacent habitat is available. Eastern indigo snakes would also be vulnerable to mortality as a result of injuries sustained during activities such as vegetation clearing and grading.

The probability and level of incidental take is dependent upon the number of eastern indigo snakes within the region; their ability to disperse; and the amount and distribution of available suitable habitat. It is possible that as construction proceeds, they will move away from the construction site; however, the USFWS anticipates that "take" will occur. Incidental take in the form of mortality to eastern indigo snakes would be avoided through preconstruction surveys and relocation of any individuals present within the boundaries of the work area. Prior to any land disturbance activities, a survey would be required to identify locations of gopher tortoise burrows within the project areas. This survey would include a burrow count and habitat characterization and would be conducted in accordance with FWCC guidelines. Any eastern indigo snakes encountered during gopher tortoise burrow excavation will be safely relocated outside the project area. In accordance with Section 7 of the ESA, the USFWS prepared a BO on this Action in April of 2008 and has issued an "Incidental Take Statement" take' for this Action.

Indirect Effect

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone Section 7 Consultations, but will result from the action under consideration. It is expected that indirect effects could occur from increased traffic along roadways due to the operation of the skid strip adjacent to occupied habitat, possibly resulting in indigo snakes being struck by vehicles. The eastern indigo snake has a high probability of being impacted by increased traffic on the roads. Since a portion of their suitable habitat will be impacted by the proposed development, the indigo snakes may have to go elsewhere and cause them to cross busy roads which could result in road-kill mortality.

No-Action Alternative

Under the No-Action Alternative, no changes to the landscape, no increased traffic and no clearing would occur. Therefore, it is not expected that the eastern indigo snake would be affected by the no action alternative.

Mitigation Measures

Mitigation for direct and indirect impacts to the eastern indigo snake would offset impacts caused by the proposed action. Therefore, the proposed action would not significantly impact the eastern indigo snake population at CCAFS provided the

reasonable and prudent measures as listed on page 31 and 32 of Appendix B and the Terms and Conditions listed on page 33 and 34 of Appendix B are implemented. Generally, those mitigation measures include the following discussion.

The 45th SW Indigo Snake Protection/Education Plan will be presented to the project manager, construction manager and personnel. An educational sign will be displayed at the site informing personnel of the snake's appearance, its protected status, and who to contact if any are spotted in the area. If any indigo snakes are encountered during clearing activities, they will be allowed to safely leave the area on their own. Furthermore, any indigo snakes encountered during gopher tortoise burrow excavation, if required, will be safely moved out of the project area. An eastern indigo snake monitoring report will be submitted in the event that any indigo snakes are observed. If a dead indigo is found at the project site, it will be salvaged in accordance with proper protocols and notification will be made to the USFWS office in Jacksonville. Impacts to the species will be minimized by restoring 1,157.48 acres of potential scrub-jay, beach mouse and eastern indigo snake habitat at CCAFS over a nine-year period. Only individuals with permits should attempt to capture the eastern indigo snakes. If an indigo snake is held in captivity, it should be released as soon as possible in release sites approved by the USFWS on the CCAFS.

4.1.3.4 Marine Turtles

Proposed Action

The USFWS concurs with the 45th SW's determination that the proposed project may affect but is not likely to adversely affect the loggerhead, green, leatherback, hawksbill, and Kemps ridley sea turtles provided a Light Management Plan is prepared for the Airfield and is approved by the USFWS.

Although the proposed clearing and construction of new facilities will not impact the nesting beach, exterior lighting proposed for the new facilities has the potential to be visible from the beach. Disorientation of adult or hatchling sea turtles could result in an indirect take on the adjacent beach.

Lighting visible from the beach can cause adult and hatchling sea turtles to move landward, rather than seaward, which increases the chances of mortality. Adherence to "45th SW Instruction 32-7001, Exterior Lighting Management" will reduce the potential for disorientation to occur". Strict adherence to the plan will be monitored to ensure disorientation is kept to a minimum.

No-Action Alternative

Under the No-Action Alternative, no changes to lighting, and landscape would occur as a result of the expansion of the skid strip. Therefore, no impacts to protected sea turtles are expected.

Mitigation Measures

Significant impacts to sea turtles are not expected provided mitigation measures are implemented. To minimize impacts to sea turtles from new facility lighting, all exterior lighting proposed for this project will be in accordance with the 45th SW Instruction 32-7001, *Exterior Lighting Management* dated January 25, 2008. Additionally, a Light Management Plan will be required for the new facilities. This Plan will be forwarded to USFWS for review and approval prior to any facility construction. Clearing of vegetation that violates Airfield criteria will not have an impact to nesting or hatchling sea turtles; therefore, no mitigation is required for those activities.

4.1.3.5 Gopher Tortoise

Proposed Action

Construction activities have the potential to cause harm to gopher tortoises during such project activities as ground clearance, grading, and moving equipment. The proposed clearing will result in the loss of approximately 100 acres of potential gopher tortoise habitat.

No-Action Alternative

Under the No-Action Alternative, no changes to the vegetation, landscape, foraging habitat and nesting areas would occur. Therefore, impacts to gopher tortoises are not expected.

Mitigation Measures

Significant impacts to gopher tortoises are not expected provided that minimization measures are implemented. To minimize impacts to gopher tortoises, pre-construction surveys will be conducted to locate tortoises within the project area. Tortoises found during pre-construction surveys will be relocated to nearby viable habitat within CCAFS areas. The tortoise surveys will include a burrow count and habitat characterization and will be conducted in accordance with FWCC guidelines. A monitoring report will be submitted in the event that any gopher tortoises are relocated. If a dead gopher tortoise is found at the project site, it will be salvaged in accordance with proper protocols and notification would be made to the FWCC. Gopher tortoises will be relocated in accordance with Gopher Tortoise Relocation Permit WR04151c.

4.2 CULTURAL RESOURCES

Impacts on cultural resources would be considered significant if they resulted in disturbance or loss of value or data that qualify a site for listing in the National Register of Historic Places; if there was substantial disturbance or loss of data from newly discovered properties or features prior to their recordation, evaluation, and possible treatment; or if the project substantially changed the natural environment or access to the property such that the practice of traditional cultural or religious activities was restricted.

4.2.1 Archeological Resources

Proposed Action

The 45th Space Wing Cultural Resources Manager CRM) developed a predictive model for prehistoric site potential for CCAFS and this was applied to the proposed project area. This model consists of designating high, medium and low areas of archaeological potential (AAPs) based upon the locations of previously recorded sites, temporal period of known sites, soil types, elevation topography, distance to water, and vegetation. It should be noted AAP studies are for prehistoric sites only. The 45th SW CRM designated two High AAPs and two Low AAPs. High AAP 1 is located at the eastern end of the Skid Strip. This area is within proximity to a relic freshwater source, there are several previously recorded prehistoric sites within 500 meters, and the presence of other prehistoric sites located within similar environmental conditions. High AAP 2 is located at the western end of the Skid Strip and was designated as such due to the high number of sites within 500 meters and its close proximity to the Banana River Lagoon, a high sensitivity area of numerous previously recorded prehistoric sites. Both the north and south sides of the Skid Strip are Low AAPs. There is a low probability of there being a prehistoric archaeological site within these two areas. If a prehistoric site is present it would typically be an isolated find or small cluster of artifacts. It should be noted at the northwestern corner of the Skid Strip was a single site which was identified previously as not eligible for the NRHP and no further action was needed. It is thought there may have been a historic homestead in this area but it is now thought it was destroyed by the expansion of the CCAFS landfill. The Skid Strip itself and associated facilities could be potentially NRHP eligible facilities.

In an effort to mitigate any impacts to cultural resources within the project area the 45th SW CRM consulted with the Florida SHPO. The 45th SW CRM proposed the following actions with the concurrence of SHPO so the proposed undertaking can proceed:

- a. The Skid Strip and associated facilities, though not directly impacted by the proposed undertaking will be assessed by the 45th SW CRM and will include a determination of eligibility and documentation with Florida Master Site File Historic Structure forms, current photographs, and as-built drawings.
- b. The two High AAPs will be subjected to a formal Phase I archaeological survey to include a surface reconnaissance survey of the entire High AAPs and subsurface testing in areas that will be subjected to subsurface disturbances
- c. The Low AAPs are in areas of dense vegetation that makes a surface reconnaissance level survey. Using the same methodology used for the controlled burn program, the 45th SW CRM will conduct a surface reconnaissance survey as the vegetation is cleared from these areas. In the event that cultural material is found, all work will stop and the location will be

assessed by the 45th SW CRM and subjected to a Phase I survey if deemed appropriate.

- d. A cultural resources assessment report will be submitted upon completion of the archaeological surveys and will conform to the requirements of the Florida Division of Historical Resources.

A letter dated April 9, 2009 from the Florida SHPO documenting this consultation is provided as Appendix D.

No-Action Alternative

Under the No-Action Alternative, there are no cultural, archeological, or historical resources that would be affected.

4.3 WATER RESOURCES

A project may have a significant impact on water resources if it substantially affects any significant water body, such as an ocean, stream, lake, or bay; causes substantial flooding or exposes people to reasonably foreseeable hydrologic hazards such as flooding; substantially affects surface or groundwater quality or quantity; or exceeds the existing potable water or wastewater system capacities for CCAFS.

This section describes the potential effects to surface water and groundwater, including hydrology and water quality, as well as wetlands, resulting from either implementation of the Proposed Action, the Alternative to the Proposed Action or the No-Action Alternative. There would be no long-term significant effects on water resources as a result of implementation of the Proposed Action or Alternative to the Proposed Action if mitigation measures are employed.

Proposed Action

Wetland Resources

While planned demolition will remove some impervious areas, construction of the new Airfield complex will result in a net increase in impervious area that will require an additional 24 acres of dry stormwater retention and a change in the SJRWMD Stormwater Management Permit. Noble Engineering was contracted to study the stormwater needs of the new Airfield complex. In addition, Noble Engineering has studied relocating the upland cut ditch under the project footprint. One of the ditches is on the west end and drains surface run-off to the north and south and then eventually to the Banana River to the west. The USACE indicated that this drainage ditch would be considered a jurisdictional wetland due to its connection to Banana River. The ditch on the east end drains surface water to the south. This drainage ditch is considered to be an upland cut and not jurisdictional under the CWA per discussions with the SJRWMD and with the USACE (USACE Site Meeting, 27 February 2007). Should alterations be required of the jurisdictional west ditch/wetland, then a permit under Section 404 of the

CWA from the USACE would be required. Section 404 requires that measures be taken to: (1) avoid and (2) minimize impacts to Waters of the U.S. In the 404 permit, a mitigation monitoring plan would be developed and coordinated with the appropriate resource agencies, and a final plan would be approved by the USACE. Standard construction practices and adherence to permit requirements and applicable regulations would minimize impacts to water resources; therefore, no mitigation measures would be required. Because the ditches are close to the skid strip, and the proposed action requires that all new clear areas be level and absent of any depressions or mounds, the ditches will have to be moved, or partially enclosed in a culvert. There is no other option to meet the requirement of a level clear zone. Significant impacts to wetland resources are not likely to occur to wetlands as a result of this proposed action.

Surface Water Resources

Since the disturbed area is greater than one acre, a standard NPDES Storm Water Construction Permit would be required by FDEP and a SWPPP would be implemented. An Environmental Resource Permit would also be required by SJRWMD for any activity that meets the requirements listed in Rule 40C, F.A.C. Additionally, 45th SW personnel would review the design drawings for all construction-related projects. This process is normal and ensures that the design is in compliance with current and applicable storm water and wastewater regulations. Therefore, significant impacts are not likely to occur to surface water resources as a result of this proposed action.

Groundwater Resources

Groundwater at the Airfield is not used as a source of potable water. The Proposed Action is not expected to significantly impact groundwater quality or significantly alter the hydrogeologic characteristics of the surficial aquifer.

Water Supply

Water for CCAFS is acquired from the City of Cocoa's municipal potable water distribution system under a long-term agreement. The City's contract is with the U.S. Government and includes KSC, CCAFS and Patrick Air Force Base (PAFB). A total of 6.5 million gallons per day (MGD) is allocated for all three facilities. Historically, total consumption of water from the city for all three facilities has averaged 3.7 MGD. The Airfield buildings obtain their water from this system. While the new facilities will be slightly larger, water consumption is not likely to increase. The Proposed Action is not expected to significantly impact the water supply.

No Action Alternative

Under the No-Action Alternative, no changes to the hydrology or water quality are expected. No construction or modification of facilities would occur; therefore, no impacts to hydrology or water quality are expected.

4.4 ENVIRONMENTAL JUSTICE

Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, EO 12898, requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Environmental Justice analysis needs be applied only to adverse environmental impacts (AF, 1997). Based on preliminary guidance provided by the Federal Interagency Working Group on Environmental Justice, adverse may be defined as “having a deleterious effect on human health or the environment that is significant, unacceptable, or above generally accepted norms.” Adverse human health effects include bodily impairment, infirmity, illness, or death. Adverse environmental effects may include ecological, cultural, human health, economic, or social impacts when interrelated to impacts on the natural or physical environment. The Proposed Action areas are not located adjacent to minority populations or low-income population centers, and indirect impacts to such communities located in the surrounding areas were not identified during the analysis of the Proposed Action; therefore, the Proposed Action would not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

4.5 CUMULATIVE IMPACTS

Cumulative adverse impacts would occur for the Florida scrub-jay and eastern indigo snake. When evaluated with other projects occurring or proposed on CCAFS, the proposed removal of 400 acres of occupied/potential habitat would result in a reduction of available breeding habitat, as well as a reduction in the availability of scrub habitat for restoration. However, the restoration of 1,100+ acres of currently unoccupied habitat (compensation for the proposed action) will help the USAF reach the INRMP goal of 300 breeding pairs of scrub-jays on CCAFS. The net impact would be an increase in scrub-jay habitat.

Cumulative impacts associated with the restoration program, specifically, controlled burning, are expected to be minimal. The AM is a member of the CCAFS Prescribed Burn Working Group and has the authority to determine whether or not a burn will take place. Over the past several years, the AM has never stopped a controlled burn from occurring. There may be restrictions on where the USAF can conduct a burn in order to ensure no smoke is placed on the Airfield during operations; however, the USAF has land management units prepared in different areas at any one time so that there is always an area available to burn depending on wind direction.

Cumulative impacts on southeastern beach mice are not expected to be significant. When evaluated with other projects occurring or proposed on CCAFS, the proposed project would result in a reduction in available breeding habitat. Scrub restoration activities have resulted in the species relocating from what was thought to be typical

habitat (coastal dune and strand). Restoration activities occurring on CCAFS are expected to continue to create habitat for beach mice, which will not only result in a population increase, but will likely result in these areas serving as sources of individuals to repopulate coastal dunes and swales following hurricanes events.

Cumulative impacts on sea turtles have the potential to occur due to increased lighting. The new facilities will result in more exterior lighting than is currently present at existing facilities, which could lead to disorientation of adult and hatchling sea turtles on the adjacent beach. Adherence to the Light Management Plan and Air Force lighting policies will help reduce these impacts.

Cumulative impacts to gopher tortoises is not likely to occur since the expanded areas around the airstrip would provide mowed areas for tortoises to populate and use as foraging areas.

According to the INRMP, projects occurring on CCAFS that have the potential to adversely impact scrub-jays are reviewed through the Section 7 Consultation process. Loss of scrub habitat will be compensated at a ratio of 3:1, in accordance with the CCAFS Scrub Compensation Plan. In addition, clearing activities associated with certain projects may be restricted to those months outside the scrub-jay nesting season (March 1st– June 30th). Prior to any construction or excavation activities, a biological survey would need to be conducted to identify gopher tortoises present at the site. This survey would include a burrow count and habitat characterization and be conducted in accordance with FWCC guidelines. If gopher tortoises are found to be present, gopher tortoises would be relocated to nearby suitable habitat in accordance with FWCC guidelines. In order to ensure that the lighting of the facility does not impact sea turtles, a light management plan would be approved by the USFWS and implemented prior to construction activities and activation of the launch facility.

5.0 CONCLUSIONS AND ENVIRONMENTAL IMPACTS

This EA evaluated the potential environmental impacts associated with a number of individual projects planned by the USAF which would accomplish improvements to the CCAFS Skid Strip Airfield. A total of 29 SRMC projects and four MILCON projects, which are designed to update and eliminate certain safety issues and bring the Airfield into compliance with current USAF instructions, have been evaluated for environmental impacts. Program initiation is expected in 2009 with ultimate completion in 2020.

The Proposed Action generally includes the establishment of a clear zone around the Airfield, which will result in the removal of approximately 410 acres of vegetation; rerouting or the enclosing portions of two man-made drainage ditches; demolition of the existing control tower and associated buildings; construction of a new control tower, operations building, and aircraft parking apron; installation of a perimeter fence; and removal/relocation of utilities, poles, fire hydrants, etc. No significant environmental impacts were identified that would require the completion of an EIS. However, some less than significant impacts were identified and are summarized below in Table 5-1, along with measures to minimize or compensate for any impacts, and applicable regulatory guidance. A letter response from the Florida State Clearinghouse indicating their review comments on the draft final EA is included as Appendix E. Comments did not affect the EA as written.

Table 5-1: Environmental Assessment Summary Matrix

Resource Category	Potential/Known Impact(s)	Mitigation, Minimization Measure(s) and Applicable Guidance
Air Quality	Short term, non-significant impacts to air quality from particulate matter, CO, SO ₂ , and NO _x and dust	Periodically water the construction site and restrict vehicle speeds for dust control. CCAFS is in an Air Quality Attainment area.
Biological Resources	Less than significant direct impacts to plant communities by removal of plants	Approximately 1,157 acres of overgrown scrub-jay habitat would be restored elsewhere on the CCAFS.
Biological Resources	Potential disturbance of birds protected by MBTA and ESA and potential disturbance of wildlife	Where possible, avoid work during nesting season in areas where nests are found. For all other birds, including ground nesting birds, young would be allowed to fledge prior to clearing and construction work.
Biological Resources	Direct and indirect impacts to Scrub-Jays	Proposed project area would eliminate approximately 410 acres of scrub-jay habitat in phases over several years. The USAF will compensate this impact with restoring approximately 1,157 acres of scrub-jay habitat, also in phases. CCAFS would avoid construction in scrub-jay occupied areas during the nesting season from March 1 through June 30; ensure that prior to clearing of scrub-jay habitat there is suitable habitat within 1200 feet; that the USFWS would be notified of any unauthorized taking of scrub-jays identified

Resource Category	Potential/Known Impact(s)	Mitigation, Minimization Measure(s) and Applicable Guidance
		during construction; and that CCAFS would conduct routine scrub-jay monitoring and submit reports describing the actions taken to implement the terms and conditions of the "Incidental Take Statement". Implement requirements of USFWS Biological Opinion (Appendix B).
Biological Resources	Direct and indirect impacts to Southeastern Beach Mouse	Creation of approximately 1000 acres of southeastern beach mouse habitat would expand the beach mouse territory. If a dead beach mouse is found during construction of the project, it will be salvaged in accordance with proper protocols and notification will be made to the USFWS in Jacksonville. Implement requirements of USFWS Biological Opinion (Appendix B).
Biological Resources	Direct and indirect impacts to Eastern Indigo Snake	An Indigo Snake Protection/Education Plan will be presented to the project manager, construction manager and personnel. An educational sign will be displayed at the site informing personnel of the snake's appearance, its protected status, and who to contact if any are spotted in the area. Implement requirements of USFWS Biological Opinion's reasonable and prudent measures as well as the Terms and Conditions shown on pages 31, 32 and 33, 34 of Appendix B respectively.
Biological Resources	Potential impacts to Sea Turtles	Adherence to 45 th SW Instruction 32-7001, <i>Exterior Lighting Management</i> and development of a Light Management Plan for the new Airfield buildings and control tower facility.
Cultural Resources	Less than significant impact to prehistoric and historic cultural remains within the project area	Evaluation of known areas of concern as part of a Section 106 Consultation, and an archaeological reconnaissance survey in areas previously not surveyed. See Appendix D
Water Resources- Wetlands	Less than significant impact to several man-made drainage ditches and swales located on or immediately adjacent to the skid strip.	Should alterations be required of the jurisdictional west ditch/wetland, then a permit under Section 404 of the CWA from the USACE would be required. Section 404 requires that measures be taken to: (1) avoid and (2) minimize impacts to Waters of the U.S. Standard construction practices and adherence to permit requirements and applicable regulations would minimize impacts to water resources; therefore, no mitigation measures would be required. Significant impacts to wetland resources are not likely to occur to

Resource Category	Potential/Known Impact(s)	Mitigation, Minimization Measure(s) and Applicable Guidance
		wetlands as a result of this proposed action.
Hazardous Materials/Waste	Less than significant impact to hazardous materials /waste and presence of RACM or LBP may be present in the existing control tower and area office buildings.	Asbestos and/or LBP survey will be necessary prior to any renovation or demolition activities. Execute proper abatement activities in accordance with USAF and OSHA regulations.
Health and Safety	Less than significant impact to Health and Safety issues during construction and operation of facilities	Adherence to OSHA regulation 29 CFR 1926, Safety and Health Regulations for Construction; development of a Site Safety Plan; implementation of NFPA 30 & 321, OAR 473-004-0720 and OSHA Standard 1910.106.
Infrastructure and Transportation	Less than significant impact to underground utilities from excavation activities	Obtain dig permit prior to ground disturbance.
Noise	Less than significant impact to animals, workers and surrounding personnel.	Use administrative or engineering controls and PPE when necessary.
Land Use & Zoning	No impact	No change in land use or zoning; increased safety of aircraft, aircrews and ground personnel.
Socioeconomics	Negligible Impact	Potential short-term positive impact in additional jobs during land clearing and construction related activities

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Appendix A

Skid Strip MILCON and SRMC Projects

APPENDIX A
MILCON and SRMC Programmed Projects
SKID STRIP IMPROVEMENT PROGRAM

ITEM	PROJECT TITLE	PROJECT NUMBER	AREA	FISCAL YEAR	COMMENTS
1	Apron	DBEH053001			Milcon
2	Air Traffic Control Tower	DBEH053002			Milcon
3	Base Operations Facility	DBEH053003			Milcon
4	Install Perimeter Fence	DBEH051518			Milcon (not listed as such yet)
5	East Clearzone, Zone of Frangibility, Approach Departure	DBEH001631	1	09	57.27 acres
6	West Clearzone, Zone of Frangibility, Approach Departure	DBEH031576	2	10	56.57 acres
7	Primary/Transitional	DBEH041640	3	10	73 acres
8	Primary/Transitional	DBEH041641	4	10	20.61 acres
9	Primary/Transitional	DBEH041642	5	11	26.30 acres
10	Primary/Transitional	DBEH 041643	6	12	37.94 acres
11	Apron, Hanger, Taxiway	Multi	7	12	37.00 acres
12	Primary/Transitional	DBEH 041644	8	13	26.30 acres
13	Primary/Transitional	DBEH041645	9	14	46.68 acres
14	Primary/Transitional	DBEH041646	10	15	32.04 acres
15	Primary/Transitional	DBEH041647	11	16	18.31 acres
16	Primary/Transitional	DBEH041648	12	17	24.74 acres
17	Construct Paved Overrun East end	DBEH031590			
18	Construct Paved overrun West end	DBEH031591			
19	Repair Drainage ditch, East end Clear Zone	DBEH001630			Need to check for Wetlands designation
20	Reroute or enclose drainage ditch west end	DBEH041618			Need to check for Wetlands designation: recommend enclosure rather than re-route to avoid IRP site.
21	Install Lighting protection at new Tower	DBEH041674			
22	Construct Foundation for Mobile Aircraft Arresting System	DBEH051570			
23	Replace Turning Areas Skid Strip	DBEH031578			
24	Airfield Rotating Beacon	DBEH011653			
25	Demolish Skid Strip Camera Pad	DBEH041582			
26	Replace approach lighting system with ALSF-1 System	DBEH041619B			East end
27	Install ALSF-1 System on Skid Strip Approach	DBEH041619C			West end
28	Repair grading / lighting Airfield Apron	DBEH041620B			
29	Install paved Shoulders Apron	DBEH041620C			
30	Grade, Sod and Seed Runway Lateral Clearance	DBEH041652			
31	Demolish old Tower				New
32	Demolish old Operations building				New
33	Demolish/remove old turning Apron				New

Appendix B

US FWA Biological Opinion



United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:

FWS Log Number: 41910-2008-F-0148

May 8, 2008

45 SW/CC

Attn: Brigadier General Susan J. Helms
1201 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299

FWS Log Number: 41910-2008-F-0148

Dear Brigadier Helms:

This document is the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed Skid Strip modification on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the Florida scrub-jay (*Aphelocoma coerulescens*), southeastern beach mouse (*Peromyscus polionotus niveiventralis*), eastern indigo snake (*Drymarchon corais couperi*), loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles, pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for formal consultation for these species was received on January 15, 2008.

The 45th Space Wing (SW) has determined that the proposed project may affect and is likely to adversely affect the Florida scrub-jay, southeastern beach mouse and the eastern indigo snake. The Service concurs with your determination. The 45th SW also determined that the proposed project may affect but is not likely to adversely affect the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles. Based on our discussions and review of the project plans, the Service concurs with this determination provided the Light Management Plan for the Skid Strip modification and associated facilities are reviewed and approved by the Service.

This BO is based on information provided in the final Biological Assessment (BA) for the Skid Strip modification received on January 15, 2008, a meeting conducted on July 25, 2006, and March 27, 2007, with representatives from the 45th SW, and the Service, email correspondence on February 12, 2008, and March 10, 2008, with Angy Chambers, a representative of the 45th

SW, and other sources of information. A complete administrative record is on file at the Ecological Services Office in Jacksonville, Florida.

CONSULTATION HISTORY

On July 20, 2001, the Service received a letter requesting informal consultation on the installation of three electronic wind indicators near the east and west terminus and mid-point of the CCAFS existing Skid Strip. In accordance with the CCAFS Scrub Habitat Compensation Plan, compensation for the loss of 25 acres was completed through the restoration (cutting/burning) of 100 acres of mature scrub located on the south portion of CCAFS.

On July 25, 2006, the Service met with representatives of the 45th SW to discuss another project. At that meeting, the Skid Strip was briefly discussed. On March 27, 2007, the Service met with representatives from CCAFS to discuss the Skid Strip. At that meeting, the Service discussed with representatives of the 45th SW the impacts of the proposed project on the scrub-jay recovery goals at CCAFS. Clearing the 410.83 acres of scrub-habitat will not remove them from achieving their recovery goals. The proposed restoration will create two scrub-jay corridors and will take place in addition to the 500 acres of scrub restoration per year using mechanical treatment followed by controlled burning as a goal in the Integrated National Resources Management Plan (INRMP).

On January 15, 2008, the Service received the BA initiating formal consultation on the Skid Strip modification.

Scrub management at CCAFS through prescribed burning has its limitations due to the sensitivity of equipment to smoke in the various facilities. A prescribed burn working group has been established at CCAFS to help resolve some of these issues. On March 10, 2008, the Service received an email from Angy Chambers, a representative of the 45th SW, with information on burn restrictions on the skid strip modification and associated facilities. The new facilities are not expected to have any more control burn restrictions than the current facilities. The current facilities have never restricted prescribed burning windows and that is not expected to change.

The Service notified the representatives of the 45th Space Wing that all the necessary information from the Air Force was received to complete the BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Air Force proposes to modify and expand the Skid Strip (runway/airfield) at CCAFS in Brevard County, Florida. The Skid Strip at CCAFS was originally constructed in 1952 as a missile Landing Facility. Aircrafts used the runway for take-offs and landings. In 1994, property category code change and application of guidance occurred for the skid strip. Operational deficiencies were found and an initial phase of corrective actions was taken to

eliminate immediate concerns. Remaining deficiencies and longer term projects to support growth and planning strategies were developed.

The proposed action consists of several projects schedules to begin in the fiscal year 2008 and end in the fiscal year 2017. These projects consist of construction of a new apron, air traffic control tower, airfield operations building, and removal of vegetation that currently violates airfield criteria. The vegetation located within the airfield surface zone must be removed to bring the airfield into compliance with certain criteria that require no obstructions to be located within a certain distance around the entire airfield, as well as the approach and departure zones. The new facilities are meant to bring the airfield up to current standards.

The action area (area including all direct and indirect effects), for the purpose of this consultation, will include all of CCAFS. The perimeter of the airfield is located in the central portion of CCAFS. Currently, regularly mowed and maintained grasses are found approximately 500 feet from the centerline of the runway. The remaining vegetation beyond this is forested and categorized as coastal/oak scrub. Along the southeastern side of the airfield, the coastal strand indicator species such as wax myrtle (*Myrica cerifera*) are found in higher densities. The vegetation types have developed into a closed canopy, and tree heights are typical in a xeric hammock. Fifty years of fire suppression at CCAFS has created this expansive hammock scrub.

The coastal/oak scrub around the airfield consists of oaks with a maximum height of approximately 25 feet to 30 feet. Tree-sized cabbage palms (*Sabal palmetto*) and red bays (*Persea borbonia*) are interspersed with shrubby saw palmetto (*Serenoa repens*), wax myrtle, tough buckthorn (*Bumelia tenax*), nakedwood (*Myrsianthes fragrans*) and rusty lyonia (*Lyonia ferruginea*). All areas surrounding the airfield, excluding treated scrub and some disturbed areas, range from 5 feet to 30 feet in height. The extreme western edge of the airfield is the only area that has undergone scrub restoration treatment. The canopy of these areas is low-stature, averaging approximately 5 feet to 15 feet.

The clearing of vegetation around the airfield will be phased over several years, with the first proposed project to begin in the later part of 2008. The total clearing of the vegetation around the airfield will result in the removal of just over 373 acres. The construction of the new facilities proposed will occur in fiscal year 2012 and will result in the removal of approximately 37 acres if vegetation.

Table 1. Acreage and location of vegetation removal for Skid Strip modification on CCAFS.

Area	Acreage	Land Management Units Impacted (LMU)	Proposed fiscal year
Area 1	57.27	72, 73	2009
Area 2	56.57	38, 39, 49	2010
Area 3	27.07	73	2010
Area 4	20.61	70, 72	2010
Area 5	26.30	75	2011
Area 6	37.94	65, 70, 71	2012

Area 7	37.00	66	2012
Area 8	26.30	75	2013
Area 9	46.68	66	2014
Area 10	32.04	47	2015
Area 11	18.31	66	2016
Area 12	24.74	48	2017
TOTAL ACREAGE			
410.83			

The amount of scrub habitat or degraded scrub habitat to be removed for the proposed project is 410.83 acres. All of this habitat was or is oak scrub.

Currently, LMU 38, 39, 66, 48 and 49 is occupied by scrub-jays. This includes five groups of scrub-jays totally 12 individual birds documented in these areas.

Conservation measures agreed to by CCAFS include restoration of the following LMUs:

Table 2. Proposed Restoration acreage for each LMU.

Area	Land Management Units Impacted (LMU)	Proposed fiscal year	Proposed Restoration LMUs	Proposed Restoration Acreage
Area 1	72, 73	2009	72, 89	121.66
Area 2	38, 39, 49	2010	40, 36, 37, 38	178.98
Area 3	73	2010	74	68.74
Area 4	70, 72	2010	65	46.05
Area 5	75	2011	76	54.48
Area 6	65, 70, 71	2012	70	165.89
Area 7	66	2012	67, 78	54.91
Area 8	75	2013	78	63.75
Area 9	66	2014	66, 79	61.20
Area 10	47	2015	55, 36	103.98
Area 11	66	2016	33	71.06
Area 12	48	17	84, 48	166.78
TOTAL ACREAGE			TOTAL RESTORATION ACREAGE	
410.83			1157.48	

The Air Force proposes to restore unoccupied scrub-jay habitat at a ratio of 3:1. Before any clearing is conducted on scrub-jay occupied areas, the LMU adjacent to the impacted area proposed for restoration will be conducted. The proposed areas to be restored will help create two scrub-jay corridors. The first will connect the population of scrub-jays along Phillips Parkway and Pier Road with the population to the north. The second will connect the population

along Phillips Parkways to that along Pier Road. A combination of mechanical treatments and prescribed burning will be used to restore the habitat.

The new facilities associated with the skid strip are not expected to have any more burn restrictions than the current facilities on CCAFS. The current facilities have never restricted prescribed burning and this is not expected to change with the additional facilities.

Skid Strip Overview Map

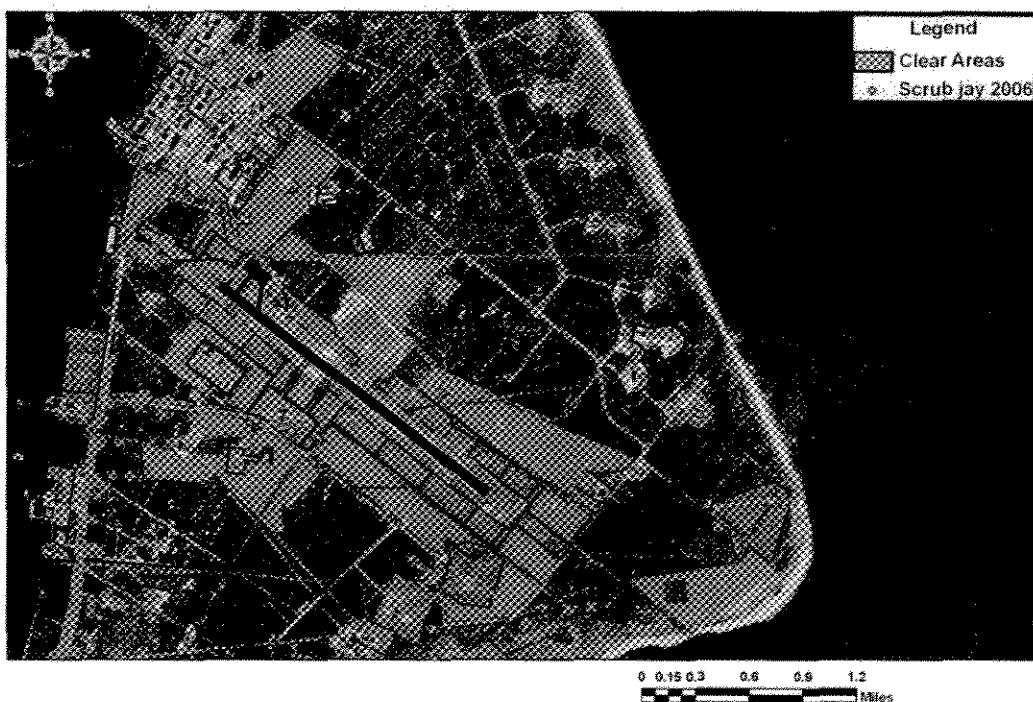


Figure 1. Overlay of Skid Strip and scrub-jay occupied areas on CCAFS.

STATUS OF THE SPECIES/CRITICAL HABITAT

This section provides pertinent biological and ecological information for the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake, as well as information about their status and trends throughout their entire range. We use this information to assess whether a federal action is likely to jeopardize the continued existence of the above-mentioned species. The "Environmental Baseline" section summarizes information on status and trends of the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake specifically within the action area. These summaries provide the foundation for our assessment of the effects of the proposed action, as presented in the "Effects of the Action" section.

FLORIDA SCRUB-JAY (*APHELOCOMA COERULESCENS*)

Species/Critical Habitat Description

Florida scrub-jays are about 10 to 12 inches long and weigh about 3 ounces. They are similar in size and shape to the blue jay (*Cyanocitta cristata*), but differ significantly in coloration (Woolfenden and Fitzpatrick 1996a). Unlike the blue jay, the scrub-jay lacks a crest. It also lacks the conspicuous white-tipped wing and tail feathers, black barring, and bridle of the blue jay. The Florida scrub-jay's head, nape, wings, and tail are pale blue, and its body is pale grey on its back and belly. Its throat and upper breast are lightly striped and bordered by a pale blue-grey "bib." Scrub-jay sexes are not distinguishable by plumage, and males, on the average, are only slightly larger than females (Woolfenden 1978). The sexes may be differentiated by a distinct "hiccup" call vocalized only by females (Woolfenden and Fitzpatrick 1986). Scrub-jays that are less than about five months of age are easily distinguishable from adults; their plumage is smokey grey on the head and back, and they lack the blue crown and nape of adults. Molting occurs between early June and late November and peaks between mid-July and late September (Bancroft and Woolfenden 1982). During late summer and early fall, when the first basic molt is nearly done, fledgling scrub-jays may be indistinguishable from adults in the field (Woolfenden and Fitzpatrick 1984). The wide variety of vocalizations of the scrub-jay is described in detail in Woolfenden and Fitzpatrick (1996b).

No critical habitat has been designated for this species; therefore none will be affected by the proposed project.

Life History/Population Dynamics

Scrub-jays are non-migratory, extremely sedentary, and have very specific habitat requirements (Woolfenden 1978). They usually reside in oak scrub vegetated with sand live oak, myrtle oak, inopine oak, and Chapman oak, along with saw palmetto, scrub palmetto, scattered sand pine, and rosemary. Such habitat occurs only on fine, white, drained sand, along the coastlines in Florida, and in dunes deposited during the Pleistocene, when sea levels were much higher than at present (Laessle 1958, 1968). Scrub-jays are rarely found in habitats with more than 50 percent canopy cover over three meters in height (U.S. Fish and Wildlife Service 1990). The habitat required for the scrub-jay greatly restricts the bird's distribution. Active management either through burning or mechanical clearing is necessary to maintain optimum conditions. In general, scrub-jay habitat consists of dense thickets of scrub oaks less than nine feet tall, interspersed with bare sand used for foraging and storing of acorns (U.S. Fish and Wildlife Service 1990).

Florida scrub-jays are monogamous and remain mated throughout the year (Sprunt 1946; Woolfenden 1978). Scrub-jays have a social structure that involves cooperative breeding, a trait that the other North American species of scrub-jays do not show (Woolfenden and Fitzpatrick 1984). Scrub-jays live in families ranging from two birds (a single mated pair) to extended families of eight adults and one to four juveniles. Fledgling scrub-jays stay with the breeding pair in their natal territory as "helpers, forming a closely-knit cooperative family group. Pre-breeding numbers are generally reduced to either a pair with no helpers or families of three to four individuals (a pair plus one or two helpers). The presence of helpers generally increases

reproductive success and survival within the group, which naturally causes family size to increase (Woolfenden and Fitzpatrick 1978).

Scrub-jays have a well-developed intrafamilial dominance hierarchy with breeder males most dominant, followed by helper males, breeder females, and finally, female helpers (Woolfenden and Fitzpatrick 1977). Helpers take part in sentinel duties (McGowan and Woolfenden 1989), territorial defense, predator-mobbing, and the feeding of both nestlings (Stallcup and Woolfenden 1978) and fledglings (McGowan and Woolfenden 1990). The well-developed sentinel system involves having one individual occupying an exposed perch watching for predators or territory intruders. When a predator is seen, the sentinel scrub-jay gives a distinctive warning call, and all family members seek cover in dense shrub vegetation (Fitzpatrick *et al.* 1991).

Florida scrub-jay pairs occupy year-round, multi-purpose territories (Woolfenden and Fitzpatrick 1984; Fitzpatrick *et al.* 1991). Territory size averages 22 to 25 acres, with a minimum size of about 12 acres. The availability of territories is a limiting factor for scrub-jay populations. Because of this limitation, non-breeding adult males may stay at the natal territory as helpers for up to five years, waiting for either a mate or territory to become available (Fitzpatrick *et al.* 1991). Birds may become breeders in several ways: (1) by replacing a lost breeder on a non-natal territory (Woolfenden and Fitzpatrick 1984); (2) through "territorial budding," where a helper male becomes a breeder in a segment of its natal territory (Woolfenden and Fitzpatrick 1978); (3) by inheriting a natal territory following the death of a breeder; (4) by establishing a new territory between existing territories (Woolfenden and Fitzpatrick 1984); or (5) through "adoption" of an unrelated helper by a neighboring family followed by resident mate replacement (B. Toland, USFWS, pers. comm. 1996). Territories can also be created by restoring habitat through effective habitat management efforts in areas that are overgrown (Thaxton and Hingtgen 1994).

To become a breeder, a scrub-jay must find a territory and a mate. Evidence presented by Woolfenden and Fitzpatrick (1984) suggests that scrub-jays are monogamous. The pair retains ownership and sole breeding privileges in its particular territory year after year. Courtship to form the pair is lengthy and ritualized, and involves posturing and vocalizations made by the male to the female (Woolfenden and Fitzpatrick 1996b). Copulation between the pair is generally out of sight of other scrub-jays (Woolfenden and Fitzpatrick 1984). These authors also reported never observing copulation between unpaired scrub-jays or courtship behavior between a female and a scrub-jay other than her mate. Age at first breeding in the scrub-jay varies from one to seven years, although most individuals become breeders between two and four years of age (Fitzpatrick and Woolfenden 1988). Persistent breeding populations of scrub-jays exist only where there are scrub oaks in sufficient quantities to provide an ample winter acorn supply, cover from predators, and nest sites during spring (Woolfenden and Fitzpatrick 1996a).

Nesting is synchronous, normally occurring from 1 March through 30 June (Woolfenden and Fitzpatrick 1990; Fitzpatrick *et al.* 1991). On the Atlantic Coastal Ridge and southern Gulf coast, nesting may be protracted through the end of July (B. Toland, USFWS, pers. comm. 1996; J. Thaxton, Uplands, Inc., pers. comm. 1998). In suburban habitats, nesting is consistently

initiated earlier (March) than in natural scrub habitat (Fleischer 1996), although the reason for this difference is unknown.

Clutch size ranges from 1 to 5 eggs, but is typically 3 or 4 eggs. Clutch size is generally larger (up to 6 eggs) in suburban habitats, and the birds try to rear more broods per year (Fleischer 1996). Eggs are incubated for 17 to 18 days, and fledging occurs 16 to 21 days after hatching (Woolfenden 1974, 1978; Fitzpatrick *et al.* 1991). Only the breeding female incubates and broods eggs and nestlings (Woolfenden and Fitzpatrick 1984). Annual productivity must average at least two fledged per pair for a population of scrub-jays to support long-term stability (Woolfenden and Fitzpatrick 1990; Fitzpatrick *et al.* 1991).

Fledglings depend upon adults for food for about 10 weeks, during, which time they are fed by both breeders and helpers (Woolfenden 1975; McGowan and Woolfenden 1990). Survival of scrub-jay fledglings to yearling age class averages about 35 percent in optimal scrub, while annual survival of both adult males and females averages about 80 percent (Fitzpatrick *et al.* unpubl. data). Data from Archbold Biological Station, however, suggest that survival and reproductive success of scrub-jays in sub-optimal habitat is substantially lower (Woolfenden and Fitzpatrick 1991). These data help explain why local populations inhabiting unburned, late successional habitats become extirpated. The longest observed lifespan of a Florida scrub-jay is 15.5 years at Archbold Biological Station in Highlands County (Woolfenden and Fitzpatrick 1996b).

Scrub-jays are nonmigratory and permanently territorial. Juveniles stay in their natal (Woolfenden and Fitzpatrick 1984). Once scrub-jays pair and become breeders, they stay on their breeding territory until death. In suitable habitat, fewer than five percent of scrub-jays disperse more than five miles (Fitzpatrick *et al.* 1991). All documented long distance dispersals have been in unsuitable habitat such as woodland, pasture, or suburban plantations. Scrub-jay dispersal behavior is affected by intervening land uses. Protected scrub habitats will most effectively sustain scrub-jay populations if they are located within surrounding habitat types that can be used and traversed by scrub-jays.

Brushy pastures, scrubby corridors along railways and road rights-of-way, and open burned flatwoods offer links for colonization among scrub-jay subpopulations. Stith *et al.* (1996) believed that a dispersal distance of five miles is close to the biological maximum for scrub-jays.

Scrub-jays forage mostly on or near the ground, often along the edge of natural or man-made openings. They visually search for food by hopping or running along the ground beneath the scrub or by jumping from shrub to shrub. Insects, particularly orthopterans (e.g., locusts, crickets, grasshoppers, beetles) and lepidopteran (e.g., butterfly and moth) larvae, form most of the animal diet throughout most of the year (Woolfenden and Fitzpatrick 1984). Acorns are the most important plant food (Fitzpatrick *et al.* 1991). From August to November each year, scrub-jays may harvest and cache 6,000 to 8,000 oak acorns throughout their territory. It is estimated that 1/3 of these acorns are later recovered and eaten. Caching allows scrub-jays to eat acorns every month of the year. This reliance on acorns and caching may constitute a major reason for the scrub-jay's restriction to the oak scrub and sandy ridges within Florida (Fitzpatrick *et al.* 1991).

Status and Distribution

The Florida scrub-jay is found exclusively in peninsular Florida, and is restricted to scrub habitat (U.S. Fish and Wildlife Service 1990). The Florida scrub-jay was listed as a threatened species on June 3, 1987 (52 FR 20715-20719). The main causes responsible for the decline were as follows:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: The existence of scrub-jays throughout their range depends on the existence of a particular seral stage of oak scrub habitat with unvegetated openings in sandy soils. This habitat occurs naturally only in localized patches associated with recent or ancient shoreline deposits. By the time of listing, large proportions of these habitat patches had been converted for human use, or were slated for imminent conversion. Most of the coastal scrub habitat had already been cleared for beachfront hotels, houses, and condominiums, and much of the central Florida scrub had been converted to citrus groves, housing developments, and commercial real estate. It was estimated that 40 percent of occupied scrub habitat had already been converted to other uses, and total population of the species had declined by at least half. As a result of rapid increase in human population numbers throughout central Florida, the pace of housing and agricultural development had accelerated since the 1960s, and it showed no signs of slowing.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes: Reported shooting of scrub-jays and collection of the species as pets were considered threats.

Disease or Predation: Disease and predation were not believed to be major threats at the time of listing.

The Inadequacy of Existing Regulatory Mechanisms: The only laws protecting the Florida scrub-jay prior to the time of listing were the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703 *et seq.*) and Florida State Law (Chapter 68A-27.004, Florida Administrative Code). Neither of these laws protected the birds from habitat destruction, which constituted the major threat to the species.

Other Natural or Manmade Factors Affecting its Continued Existence: Suppression of fire by humans was identified as a factor in species' decline at the time of the listing. Historically, lightning strikes started fires, which maintained the sparse low scrub habitat needed by Florida scrub-jays. Human efforts to suppress these fires to protect human interests allowed the scrub to become too dense and tall to support populations of scrub-jays. Vehicular mortality of scrub-jays due to accidental collisions along roadsides was recognized as a cause of the decline in some parts of the species' range.

Continued and current threats to the species include:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: Scrub habitats continued to decline throughout peninsular Florida since listing occurred, and habitat destruction continues to be one of the main threats to the Florida scrub-jay. Cox (1987) noted local extirpations and major decreases in numbers of scrub-jays and attributed them to the

clearing of scrub for housing and citrus groves. Eighty percent or more of the scrub habitats have been destroyed along the Lake Wales Ridge since pre-human settlement (Fitzpatrick *et al.* 1991). Fernald (1989), Fitzpatrick *et al.* (1991, 1994), and Woolfenden and Fitzpatrick (1996a) noted that habitat losses due to agriculture, silviculture, and commercial and residential development have continued to play a role in the decline in numbers of scrub-jays throughout the state. State-wide, estimates of scrub habitat loss range from 70 to 90 percent (Bergen 1994; Woolfenden and Fitzpatrick 1996a; Fitzpatrick *et al.* unpubl. data).

Toland (1999) estimated that about 85 percent of pre-European settlement scrub habitats had been converted to other uses in Brevard County. This is due mainly to development activity and citrus conversion, which were the most important factors that contributed to the scrub-jay decline between 1940 and 1990. A total of only 10,656 acres of scrub and scrubby flatwoods remain in Brevard County (excluding federal ownership), of which only 1,600 acres (15 percent) is in public ownership for the purposes of conservation. Less than 1,977 acres of an estimated pre-settlement of 14,826 acres of scrubby flatwoods habitat remain in Sarasota County, mostly occurring in patches averaging less than 2.5 acres in size (Thaxton and Hingtgen 1996). Only 10,673 acres of viable coastal scrubby flatwoods remained in the Treasure Coast region of Florida (Indian River, Saint Lucie, Martin, and Palm Beach Counties) according to Fernald (1989). He estimated that 95 percent of scrub had already been destroyed for development purposes in Palm Beach County.

Habitat destruction not only reduces the amount of area scrub-jays can occupy, but also increases fragmentation of habitat. As more scrub habitat is altered, the habitat is cut into smaller and smaller pieces, separated from other patches by larger distances; such fragmentation increases the probability of genetic isolation, which is likely to increase extinction probability (Fitzpatrick *et al.* 1991; Woolfenden and Fitzpatrick 1991; Snodgrass *et al.* 1993; Stith *et al.* 1996; Thaxton and Hingtgen 1996). Dispersal distances of scrub-jays in fragmented habitat are further than in optimal unfragmented habitats, and demographic success is poor (Thaxton and Hingtgen 1996; Breininger 1999).

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes: The Service knows of only a few cases where scrub-jays have been shot. One was in Volusia County which was investigated and prosecuted under the MBTA (J. Oliveros, USFWS, pers. comm.). The Florida Fish and Wildlife Conservation Commission (FWC) investigated a case in which three scrub-jays were shot in Highlands County (N. Douglass, FWC, pers. comm.). It does not seem that the small number and infrequent occurrence of scrub-jays taken in this manner has had an impact on the species.

Disease or Predation: Most Florida scrub-jays mortality probably is from predation (Woolfenden and Fitzpatrick 1996b). The second most frequent cause may be disease, or predation on disease-weakened jays (Woolfenden and Fitzpatrick 1996b). Known predators of Florida scrub-jays are listed by Woolfenden and Fitzpatrick (1990), Fitzpatrick *et al.* (1991), Breininger (1999), and K. Miller (FWC, in litt. 2004); the list includes eastern coachwhip (*Masticophis flagellum*, known to eat adults, nestlings, and fledglings), eastern indigo snake (*Drymarchon corais couperi*, known to eat adults and fledglings), rat snake (*Elaphe obsolete*), and corn snake (*E. guttata*). Mammalian predators include bobcats (*Lynx rufus*), raccoons (*Procyon lotor*),

sometimes cotton rats (*Sigmodon hispidus*, known to eat eggs), and domestic cats (*Felis cattus*, known to eat adults). Franzreb and Puschock (2004) also have documented spotted skunks (*Spilogale putorius*) and grey fox (*Urocyon cinereoargenteus*) as mammalian predators of scrub-jay nests. Fitzpatrick *et al.* (1991) suspect that populations of domestic cats are able to eliminate small populations of scrub-jays. Avian nest predators include great horned owls (*Bubo virginianus*), eastern screech-owl (*Otus asio*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), fish crow (*Corvus ossifragus*), boat-tailed grackle (*Quiscalus major*), common grackle (*Q. quiscula*), American crow (*C. brachyrhynchos*), blue jay (*Cyanocitta cristata*), and swallow-tailed kites (*Elanoides forficatus*). Fitzpatrick *et al.* (1991) reported that overgrown scrub habitats are often occupied by the blue jay, which may be one factor limiting scrub-jay populations in such areas. Raptors which seem to be important predators of adult scrub-jays are merlin (*Falco columbarius*), sharp-shinned hawk (*Accipiter striatus*), and Cooper's hawk (*A. cooperii*), and northern harrier. During migration and winter, these four raptor species are present in areas which contain scrub habitat, and scrub-jays may experience frequent confrontations (as many as one pursuit a day) with them (Woolfenden and Fitzpatrick 1990). In coastal scrub, Woolfenden and Fitzpatrick (1996b) report that scrub-jays are vulnerable to predation by raptors in October, March, and April, when high densities of migrating accipiters and falcons are present. Woolfenden and Fitzpatrick (1996b) and Toland (1999) suggest that in overgrown scrub habitats, hunting efficiency for scrub-jay predators is increased. Bowman and Averill (1993) noted that scrub-jays occupying fragments of scrub found in or near housing developments were more prone to predation by house cats and competition from blue jays and mockingbirds. Woolfenden and Fitzpatrick (1996a, 1996b) stated that proximity to housing developments (and increased exposure to domestic cats) needs to be taken into consideration when designing scrub preserves. Young scrub-jays are especially vulnerable to ground predators (e.g., snakes and mammals) before they are fully capable of sustained flight.

The Florida scrub-jay hosts 2 protozoan blood parasites (*Plasmodium cathemerium* and *Haemoproteus danilewskyi*), but incidence is low (M. Garvin pers. comm., cited in Woolfenden and Fitzpatrick 1996b). Several scrub-jays sick from these two agents in March 1992 survived to become breeders. The Florida scrub-jay carries at least 3 types of mosquito-borne encephalitis (St. Louis, eastern equine, and "Highlands jay"; M. Garvin and J. Day pers. comm., cited in Woolfenden and Fitzpatrick 1996b). Of particular concern is the arrival of West Nile virus (the agent of another type of encephalitis) in Florida during 2001; since corvids have been particularly susceptible to the disease in states north of Florida, it is expected that scrub-jays will be affected.

Woolfenden and Fitzpatrick (1996b) noted 3 episodes of elevated mortality (especially among juveniles) in 26 years at Archbold Biological Station. Each of these incidents occurred in conjunction with elevated water levels following unusually heavy rains in the fall, although high mortality does not occur in all such years. During the most severe of these presumed epidemics (August 1979 through March 1980), all but one of the juvenile cohort and almost half of the breeding adults died (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1990). The 1979-1980 incident coincided with a known outbreak of eastern equine encephalitis among domestic birds in central Florida (J. Day pers. comm., cited in Woolfenden and Fitzpatrick 1996b). From the fall of 1997 through the spring of 1998, the continuing population decline of

Florida scrub-jays along the Atlantic coast and in central Florida may have been augmented by an epidemic of unknown origin (Breininger 1999).

At CCAFS, Stevens and Hardesty (1999) noted a decline in juvenile survival from 60 to 70 percent in the preceding years to only 16 percent in 1997-98. It stayed low (only 25 percent) in 1998-99 before again climbing into the mid-60 percent range. Also, adult survival dropped from 70 to 80 percent survival in the preceding years to 50 to 60 percent in 1997-98. Overall, their annual surveys documented the largest one-year drop (pairs decreased by 17 percent and birds by 20 percent) in this population at the same time as the presumed state-wide epidemic.

In winter-summer of 1973, 15 species of helminth fauna (including 8 nematodes, 5 trematodes, 1 cestode, and 1 acanthocephalan) were found in 45 Florida scrub-jays collected in south-central Florida; the parasite load was attributed to a varied arthropod diet (Kinsella 1974). These naturally-occurring parasites are not believed to have a negative impact on scrub-jay population levels.

Larvae of a fly, *Philornis* (= *Neomusca*) *porteri*, occur irregularly on scrub-jay nestlings. The species pupates in the base of the nest; larvae locate in nares, mouth flanges, bases of remiges, and toes; apparently no serious effect on the scrub-jay host occurs (Woolfenden and Fitzpatrick 1996b). Additionally, one indescribable chewing louse (*Myrsidea* sp., R. Price pers. comm., cited in Woolfenden and Fitzpatrick 1996b), one wing-feather mite (*Pterodectes* sp.), two chiggers (*Eutrombicula lipovskyana*), and a flea (*Echidnophaga gallinacea*; J. Kinsella pers. comm., cited in Woolfenden and Fitzpatrick 1996b) occur on some individuals, usually at low densities. Nymphs and larvae of four ticks (*Amblyomma americanum*, *A. tuberculatum*, *Haemaphysalis leporispalustris*, and *Ixodes scapularis*) are known to occur on scrub-jays, as well as the larvae of the tick *Amblyomma maculatum* (L. Durden and J. Keirans pers. comm., cited in Woolfenden and Fitzpatrick 1996b). These naturally occurring parasites are not believed to have a negative impact on scrub-jay population levels.

The Inadequacy of Existing Regulatory Mechanisms: Woolfenden and Fitzpatrick (1996a) state the importance of enforcing existing federal laws regarding the management of federal lands as natural ecosystems for the long-term survival of the Florida scrub-jay. The Service consults regularly on activities on federal lands which may affect scrub-jays and also works with private landowners through section 10(a) (1) (B) incidental take permitting process of the Act when take is likely to occur and no federal nexus is present. Florida's State Comprehensive Plan and Growth Management Act of 1985 is administered mostly by regional and local governments. Regional Planning Councils administer the law through Development of Regional Impact Reviews; at the local level, although comprehensive plans contain policy statements and natural resource protection objectives, they are only effective if counties enact and enforce ordinances. As a general rule, counties have not enacted and/or enforced ordinances that are effective in protecting scrub-jays (Fernald 1989).

The Wildlife Code of the state of Florida (Chapter 68A, Florida Administrative Code) prohibits taking of individuals of threatened species, or parts thereof, or their nests or eggs, except as authorized. The statute does not prohibit clearing of habitat occupied by protected species, which limits the ability of the FWC to protect the Florida scrub-jay and its habitat.

Other Natural or Manmade Factors Affecting its Continued Existence: Human interference with natural fire regimes has continued to play a major part in the decline of the scrub-jay and today may exceed habitat loss as the single most important factor (Woolfenden and Fitzpatrick 1991, 1996a; Fitzpatrick *et al.* 1994). Lightning strikes cause virtually all naturally-occurring fires in south Florida scrub habitat (Abrahamson 1984; Hofstetter 1984). Fire has been noted to be important in maintenance of scrub habitat for decades (Nash 1895; Harper 1927; Webber 1935; Davis 1943; Laessle 1968; Abrahamson *et al.* 1984). Human efforts to prevent and/or control natural fires have allowed the scrub to become too dense and tall to support populations of scrub-jays, resulting in the decline of local populations of scrub-jays throughout the state (Fernald 1989; Fitzpatrick *et al.* 1994; Percival *et al.* 1995; Stith *et al.* 1996; Thaxton and Hingtgen 1996; Woolfenden and Fitzpatrick 1990, 1996a; Toland 1999). Woolfenden and Fitzpatrick (1996a) cautioned, however, that fire applied too often to scrub habitat also can result in local extirpations. Experimental data at Archbold Biological Station (Fitzpatrick and Woolfenden, unpubl. data) show that fire-return intervals varying between 5 and 15 years are optimal for long-term maintenance of productive Florida scrub-jay populations in central Florida. These intervals also correspond with those yielding healthy populations of listed scrub plants (Menges and Kohfeldt 1995; Menges and Hawkes 1998). Optimal fire-return intervals may, however, be shorter in coastal habitats (Breininger and Schmalzer 1990; Schmalzer and Hinkle 1992a, b; Breininger *et al.* 1995, 1998).

Stith *et al.* (1996) estimated that at least 2,100 breeding pairs were living in overgrown habitat. Toland (1999) reported that most of Brevard County's remaining scrub (estimated to be only 15 percent of the original acreage) is extremely overgrown due to fire suppression. He further suggests that the overgrowth of scrub habitats reduces the number and size of sand openings which are crucial to not only scrub-jays, but also many other scrub plants and animals. Reduction in the number of potential scrub-jay nesting sites, acorn cache sites, and foraging sites presents a problem for scrub-jays. Fernald (1989) reported that overgrowth of scrub results not only in the decline of species diversity and abundance but also a reduction in the percentage of open sandy patches (Fernald 1989; Woolfenden and Fitzpatrick 1996b). Fitzpatrick *et al.* (1994) believed that fire suppression was just as responsible as habitat loss in the decline of the scrub-jay, especially in the northern third of its range. Likewise, the continued population decline of scrub-jays within Brevard County between 1991 and 1999 has been attributed mainly to the overgrowth of remaining habitat patches (Breininger *et al.* 2001). Breininger *et al.* (1999a) concluded that optimal habitat management is essential in fragmented ecosystems maintained by periodic fire, especially to lessen risks of decline and extinction resulting from epidemics and hurricanes.

Fitzpatrick *et al.* (1991, 1994) and Woolfenden and Fitzpatrick (1996a) expressed concern for the management practices taking place on federal lands at Ocala National Forest, MINWR/KSC, and CCAFS, all supporting large contiguous populations of Florida scrub-jays. They predicted that fire suppression and/or too frequent fires (on the latter two) and silvicultural activities involving the cultivation of sand pine on Ocala National Forest would be responsible for continuing decline of scrub-jays in these large contiguous areas of scrub. These areas should be those where populations are most secure because of federal agencies' responsibilities under section 7(a) (1) of the Act. Monitoring of scrub-jay populations, demography, and nesting

success is ongoing on all of these properties to assess the effectiveness of management practices in meeting scrub-jay recovery objectives.

Housing and commercial developments within scrub habitats are accompanied by the development of roads. Since scrub-jays often forage along roadsides and other openings in the scrub, they are often killed by passing cars. Research by Mumme *et al.* (2000) along a two-lane paved road indicated that clusters of Florida scrub-jay territories found next to the roadside represented population sinks (breeder mortality exceeds production of breeding-aged recruits), which could be supported only by immigration. Since this species may be attracted to roadsides because of the open habitat characteristics, road mortality presents a significant and growing management problem throughout the remaining range of the Florida scrub-jay (Dreschel *et al.* 1990; Mumme *et al.* 2000), and proximity to high-speed paved roads needs to be considered when designing scrub preserves (Woolfenden and Fitzpatrick 1996a).

Another potential problem in suburban areas supporting Florida scrub-jays is supplemental feeding by humans (Bowman and Averill 1993; R. Bowman unpubl. data, cited in Woolfenden and Fitzpatrick 1996a; Bowman 1998). The presence of additional food may allow scrub-jays to persist in fragmented habitats, but recruitment in these populations is lower than in native habitats. However, even though human-feeding may postpone local extirpations, long-term survival cannot be ensured in the absence of protecting native oak scrub habitat, necessary for nesting.

Scrub-jays in suburban settings often nest high in tall shrubbery. During March winds, these nests tend to be susceptible to destruction (R. Bowman and G.E. Woolfenden unpubl data, cited in Woolfenden and Fitzpatrick 1996b; Bowman 1998).

Hurricanes pose a potential risk for Florida scrub-jays, although the exact impact of such catastrophic events remains unknown. Breininger *et al.* (1999b) modeled the effects of epidemics and hurricanes on scrub-jay populations in varying levels of habitat quality. Small populations of scrub-jays are more vulnerable to extirpation where epidemics and hurricanes are common. Storm surge from a category 3 to 5 hurricane could inundate entire small populations of scrub-jays, and existing habitat fragmentation could prevent repopulation of affected areas. However, this model also predicted that long-term habitat degradation had greater influence on extinction risk than hurricanes or epidemics.

Fernald (1989) reported that many of the relatively few remaining patches of scrub within the Treasure Coast region of Florida had been degraded by trails created by off-road vehicles, illegal dumping of construction debris, abandoned cars and appliances, or household waste. The invasion of these areas by exotic species, including Brazilian pepper (*Schinus terebinthifolius*), cypress pine (*Callitris* sp.), and Australian pine (*Casuarina equisetifolia*) also was a problem. Other human-induced impacts identified by Fernald include the introduction of domestic dogs (*Canis familiaris*) and cats, black rats (*Rattus rattus*), greenhouse frogs (*Eleutherodactylus planirostris*), giant toads (*Bufo marinus*), Cuban tree frogs (*Osteopilus septentrionalis*), brown anoles (*Anolis sagrei*), and other exotic animal species. These exotic species may compete with scrub-jays for both space and food, although scrub-jays sometimes feed on them.

A statewide scrub-jay census was last conducted in 1992-1993, at which time there were an estimated 4,000 pairs of scrub-jays left in the Florida (Fitzpatrick *et al.* 1994). The scrub-jay was considered extirpated in 10 counties (Alachua, Broward, Clay, Dade, Duval, Gilchrist, Hernando, Hendry, Pinellas, and St. Johns), and were considered functionally extinct in an additional 5 counties (Flagler, Hardee, Levy, Orange, and Putnam), where ten or fewer pairs remained. Recent information indicates that there are at least 12 to 14 breeding pairs of scrub-jays located within Levy County, higher than previously though (K. Miller, FWC, pers. comm. 2004), and there is at least one breeding pair of scrub-jays remaining in Clay County (K. Miller, FWC, pers. comm.. 2004). A scrub-jay has been documented in St. Johns County as recently as 2003 (J.B. Miller, FDEP, in litt. 5/13/03). Populations are close to becoming extirpated in Gulf coast counties (from Levy south to Collier) (Fitzpatrick *et al.* 1994; Woolfenden and Fitzpatrick 1996a). In 1992-1993, population numbers in 19 of the counties were below 30 or fewer breeding pairs. In the past, most of these counties would have contained hundreds or even thousands of groups (Fitzpatrick *et al.* 1994). Based on the amount of destroyed scrub habitat, scrub-jay population loss along the Lake Wales Ridge is 80 percent or more since pre-European settlement (Fitzpatrick *et al.* 1991). Since the early 1980s, Fitzpatrick *et al.* (1994) estimated that in the northern third of the species' range, the Florida scrub-jay has declined somewhere between 25 and 50 percent. The species may have declined by as much as 25 to 50 percent in the last decade alone (Stith *et al.* 1996).

On protected lands, scrub-jays have continued to decline due to inadequate habitat management (Stith 1999). However, over the last several years, steps to reverse this decline have occurred, and management of scrub habitat is continuing in many areas of Florida (Hastie and Eckl 1999; Stith 1999; TNC 2001; A. Birch, Brevard County Environmentally Endangered Lands (EEL), pers. comm.; M. Camardese, CCAFS, pers.comm.).

Analysis of Brevard County historic aerial photography and soil maps suggest that pre-European settlement oak scrub, scrubby pine flatwoods, and coastal scrub/strand covered at least 53,000 acres outside of federal lands (Toland 1999). Assuming average territory size of 25 acres per breeding pair, there were probably originally 2,200 to 2,500 Florida scrub-jay territories within Brevard County. The 1992-1993 statewide survey estimated that on federal lands within Brevard County, there were 860 pairs of Florida scrub-jays remaining; outside of federal lands, 276 breeding pairs of scrub-jays were present (Fitzpatrick *et al.* 1994). The figure on non-federal lands within Brevard County had dropped to 185 in 1999 (Toland 1999), illustrating a precipitous decline of the scrub-jay population within the county. Part of this decline may be attributed to a possible rare epidemic in 1997-1998. A total of 1,620 acres of scrub habitat have been purchased (outside federal ownership) for preservation by Brevard County EEL, the St. Johns River Water Management District (SJRWMD), and the Florida Department of Environmental Protection (FDEP); 2,500 acres more of potential scrub-jay habitat are proposed for acquisition by EEL and the SJRWMD (Toland 1999). All of these parcels need extensive restoration and management to obtain maximum usage by scrub-jays. Over the last several years, an extensive effort to restore and manage these parcels has been undertaken by EEL, the SJRWMD, and FDEP (A. Birch, pers. comm.).

In some areas of the range of the scrub-jay, it appears that the 1992-1993 state-wide census underestimated populations of scrub-jays, especially in areas where little was known about the

status of the species. The state-wide census in 1992-1993 estimated about 145 pairs of scrub-jays remained within Sarasota County (Fitzpatrick *et al.* 1994), although Christman (2000) found 196 pairs of scrub-jays. Likewise, Miller and Stith (2002) documented 54 pairs of scrub-jays within the Deep Creek area of Charlotte County, while the state-wide census in 1992-1993 documented only 19 pairs (Fitzpatrick *et al.* 1994). Given that habitat has continued to degrade and development activity has increased in these areas, it is unlikely that these increased numbers reflect a population increase, but rather a greater effort in the survey process over that undertaken in 1992-1993 (Miller and Stith 2002). Two possible reasons that the 1992-1993 state-wide census underestimated some populations are (1) there was inadequate time and/or resources to survey poorly-known areas and (2) scrubby flatwoods were often overlooked because surveyors relied on soil maps, which are not reliable predictors of where scrubby flatwoods occur.

Stith (1999) utilized a spatially explicit individual-based population model developed specifically for the Florida scrub-jay to complete a metapopulation viability analysis of the species. The species' range was divided into 21 metapopulations demographically isolated from each other. Metapopulations are defined as collections of relatively discrete demographic populations distributed over the landscape; these populations are connected within the metapopulations through dispersal or migration (National Research Council 1995). A series of simulations were run for each of the 21 metapopulations based on different scenarios of reserve design ranging from the minimal configuration consisting of only currently protected patches of scrub (no acquisition option) to the maximum configuration, where all remaining significant scrub patches were acquired for protection (complete acquisition option). The assumption was made that all areas that were protected were also restored and properly managed.

Results from Stith's (1999) simulation model included estimates of extinction, quasi-extinction (the probability of a scrub-jay metapopulation falling below 10 pairs), and percent population decline. These were then used to rank the different state-wide metapopulations by vulnerability. The model predicted that five metapopulations (NE Lake, Martin, Merritt Island, Ocala National Forest, and Lake Wales Ridge, see Figure 1) have low risk of quasi-extinction. Two of the five (Martin and NE Lake), however, experienced significant population declines under the "no acquisition" option; the probability for survival of both of these metapopulations could be improved by more acquisitions.

Eleven of the remaining 21 metapopulations were shown to be highly vulnerable to quasi-extinction if no more habitat was acquired (Central Brevard, N Brevard, Central Charlotte, NW Charlotte, Citrus, Lee, Levy, Manatee, Pasco, St. Lucie, and W Volusia). The model predicted that the risk of quasi-extinction would be greatly reduced for 7 of the 11 metapopulations (Central Brevard, N Brevard, Central Charlotte, NW Charlotte, Levy, St. Lucie, and W Volusia) by acquiring all or most of the remaining scrub habitat. The model predicted that the remaining four metapopulations (Citrus, Lee, Manatee, and Pasco) would moderately benefit if more acquisitions were made.

Stith (1999) classified two metapopulations (S Brevard and Sarasota) as moderately vulnerable with a moderate potential for improvement; they both had one or more fairly stable subpopulations of scrub-jays under protection, but the model predicted large population declines.

The rest of the metapopulations could collapse without further acquisitions, making the protected subpopulations there vulnerable to epidemics or other catastrophes.

Three of the metapopulations evaluated by Stith (1999) (Flagler, Central Lake, and S Palm Beach) were classified as highly vulnerable to quasi-extinction and had low potential for improvement, since little or no habitat is available to acquire or restore.

Analysis of the Species/Critical Habitat Likely to be Affected

The Florida scrub-jay's status since it's listing in 1987 has not improved. The above analysis clearly shows two items that are essential for recovery of this species: (1) additional purchase of scrub lands for preservation in key areas and (2) restoration and management of publicly-owned scrub lands already under preservation. Without both, it is unlikely that recovery can be achieved.

SOUTHEASTERN BEACH MOUSE (*PEROMYSCUS POLIONOTUS NIVEIVENTRIS*)

Species/Critical Habitat Description

The southeastern beach mouse was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies.

Life History/Population Dynamics

The following account is from the South Florida Multi-Species Recovery Plan, Southeastern Beach Mouse Chapter (U.S. Fish and Wildlife Service 1999) and includes minor additions and changes to update the information.

Taxonomy

Peromyscus polionotus is a member of the order Rodentia and family Cricetidae. The southeastern beach mouse (SEBM) is one of 16 recognized subspecies of oldfield mice *P. polionotis* (Hall 1981); it is one of the eight of those subspecies that are called beach mice. The SEBM was first described by Chapman (1889) as *Hesperomys niveiventris*. Bangs (1898) subsequently placed it in the genus *Peromyscus*, and Osgood (1909) assigned it the subspecific name *P. polionotus niveiventris*.

Description

The SEBM is the largest of the eight recognized subspecies of beach mice, averaging 139 mm in total length (range of 10 individuals = 128 to 153 mm), with a 52 mm tail length (Osgood 1909; Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). Southeastern beach mice have pale, buffy coloration from the back of their head to their tail, and their under parts are white. The white hairs extend up on their flanks, high on their jaw, and within 2 to 3 mm of their eyes (Stout 1992). There are no white spots above the eyes as with *P. p. phasma* (Osgood 1909). Their tail is also buffy above and

white below. Juvenile *P. p. niveiventris* are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

Habitat

Essential habitat of the SEBM is the sea oats (*Uniola paniculata*) zone of primary coastal dunes (Humphrey and Barbour 1981; Humphrey *et al.* 1987; Stout 1992). This subspecies has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980; Extine and Stout; 1987; Rich *et al.* 1993), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few meters.

Primary dune vegetation described from SEBM habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), beach morning glory (*Ipomoea stolonifera*), salt meadow cordgrass (*Spartina patens*), lamb's quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphor weed (*Heterotheca subaxillaris*) (Extine 1980).

Coastal strand and inland vegetation is more diverse, and can include beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*), oaks (*Quercus sp.*) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 1 km inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub several km from the beach habitat at Kennedy Space Center/Merritt Island NWR and CCAFS (Stout, personal communication, 2004). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Within their dune habitat, beach mice construct burrows to use as refuges, nesting sites, and food storage areas. Burrows of *P. polionotus*, in general, consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 0.6 to 0.9 m, and the escape tunnel rises from the nest chamber to within 2.5 cm of the surface (Blair 1951). A beach mouse may have as many as 20 burrows within its home range. They are also known to use old burrows constructed by ghost crabs (*Ocypode quadrata*).

Foraging

Beach mice typically feed on seeds of sea oats and dune panic grass (Blair 1951). The SEBM probably also eats the seeds of other dune grasses, railroad vine, and prickly pear cactus. Although beach mice prefer the seeds of sea oats, these seeds are only available as food after they have been dispersed by the wind. Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhardt 1978). Beach mice will store food in their burrows.

Behavior

P. polionotus is the only member of the genus that digs an extensive burrow for refuge, nesting, and food storage (Ehrhart 1978). To dig the burrow, the mouse assumes a straddling position and throws sand back between the hind legs with the forefeet. The hind feet are then used to kick sand back while the mouse backs slowly up and out of the burrow (Ivey 1949). Burrows usually contain multiple entrances, some of which are used as escape tunnels. When mice are disturbed in their burrows, they open escape tunnels and quickly flee to another burrow or to other cover (Ehrhart 1978). Beach mice, in general, are nocturnal. They are more active under stormy conditions or moonless nights and less active on moonlit nights. Movements are primarily for foraging, breeding, and burrow maintenance. Extine and Stout (1987) reported movements of the SEBM between primary dune and interior scrub on Merritt Island, and concluded that their home ranges overlap and can reach high densities in their preferred habitats.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for *P. p. niveiventer* on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). This pattern is typical of other beach mice as well (Rave and Holler 1992).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Blair (1951) indicated that beach mice are monogamous; once a pair is mated they tend to remain together until death. He also found, however, that some adult mice of each sex show no desire to pair. Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 4 to 6 cm in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949).

The reproductive potential of beach mice is generally high (Ehrhardt 1978). In captivity, beach mice are capable of producing 80 or more young in their lifetime, and producing litters regularly at 26-day intervals (Bowen 1968). Litter size of beach mice, in general, ranges from two to seven, with an average of four. Beach mice reach reproductive maturity as early as 6 weeks of age (Ehrhart 1978).

Population Dynamics

Status and Trends

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats. On the Atlantic coast of Florida, the Anastasia Island beach mouse (*P. p. phasma*) and the SEBM were federally listed as endangered and threatened, respectively, in 1989 (54 FR 20602). One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*),

was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Frank 1992).

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 280 km of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey *et al.* 1987; Robson 1989; Land Planning Group, Inc. 1991; Humphrey and Frank 1992; U.S. Fish and Wildlife Service 1993). The SEBM is geographically isolated from all other subspecies of *P. polionotus*.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, personal communication, 2004). Populations from both sides of Sebastian Inlet appear to be extirpated (A. Bard, personal communication, 2004).

The status of the species south of Brevard County is currently unknown. The surveys done during the mid-1990s indicate the distribution of this subspecies in the counties south of Brevard was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (D. Jennings, personal communication, 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (U.S. Fish and Wildlife Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by domestic cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (A. Bard, personal communication 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Beach mice along the Gulf Coasts of Florida and Alabama generally live about nine months (Swilling 2000). Field trapping research indicates that 68 percent (average) of mice alive in one month will survive to the next month. Actual survival rates indicate that 18.5 to 87 percent of individuals survive no more than four months and some mice live between 12 and 20 months (Blair 1951; Rave and Holler 1992). Holler *et al.* (1997) found that 44.26 percent of beach mice captured for the first time survived to the next season (winter, spring, summer, and fall). The mean survival rate for mice captured for a second time to subsequent capture was higher (53.90 percent). More than ten percent of mice survived three seasons after first capture, and four to eight percent survived more than one year after initial capture. Mice held in captivity by Blair (1951) and at Auburn University (Holler 1995) have lived three years or more.

Analysis of the Species/Critical Habitat Likely to be Affected

The southeastern beach mouse was listed as an endangered species primarily because of the fragmentation, adverse alteration and loss of habitat due to coastal development. The above analysis shows three items that are essential for recovery of this species: (1) purchase of coastal dune habitat for preservation; (2) removal of predation or competition by animals related to human development (cats and house mice); and (3) increase the regulations regarding coastal development.

EASTERN INDIGO SNAKE (*DRYMARCHON CORAIS COUPERI*)

Species/Critical Habitat Description

The eastern indigo snake is one of eight subspecies of a primarily tropical species; only the eastern indigo and the Texas indigo (*Drymarchon corais eebennus*) occur within the United States (U.S. Fish and Wildlife Service 1982). The eastern indigo snake is isolated from the Texas indigo snake by more than 600 miles (Moler 1992). The eastern indigo snake is the longest snake in North America, obtaining lengths of up to 104 inches (Ashton and Ashton 1981). Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (central 3-5 scale rows are lightly keeled in adult males) in 17 scale rows at midbody. Its anal plate is undivided. Its antepenultimate supralabial scale does not contact the temporal postocular scales.

The eastern indigo snake was listed as a threatened under the Act in 1978 (43 FR 4621). No critical habitat has been designated for this species; therefore none will be affected by the proposed project.

Life History/Population Dynamics

Historically, the eastern indigo snake occurred throughout Florida and into the coastal plain of Georgia, Alabama, and Mississippi (Loding 1922; Haltom 1931; Carr 1940; Cook 1954; Diemer and Speake 1983; Moler 1985a). It may have occurred in South Carolina, but its occurrence there cannot be confirmed. Georgia and Florida currently support the remaining endemic populations of eastern indigo snake (Lawler 1977). In 1982, only a few populations remained in the Florida panhandle, and the species was considered rare in that region. Nevertheless, based on museum specimens and field sightings, the eastern indigo snake still occurs throughout Florida, even though they are not commonly seen (Moler 1985a).

In south Florida, the eastern indigo snake is thought to be widely distributed and probably more abundant than in the northern limits of the range, especially compared to the low densities found in the panhandle of Florida. Given their preference for upland habitats, indigos are not found in great numbers in wetland complexes of the Everglades region, even though they are found in pinelands and tropical hardwood hammocks in extreme south Florida (Steiner *et al.* 1983).

Indigo snakes also occur in the Florida Keys. They have been collected from Big Pine and Middle Torch Keys, and are reliably reported from Big Torch, Little Torch, Summerland, Cudjoe, Sugarloaf, and Boca Chica Keys (Lazell 1989). Given the ubiquitous nature of the eastern indigo throughout the remainder of its range, it is likely that it also occurs on other Keys.

Over most of its range, the eastern indigo snake frequents a diversity of habitat types such as pine flatwoods, scrubby flatwoods, xeric sandhill communities, and tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human altered habitats. Eastern indigo snakes need a mosaic of habitats to complete their annual cycle. Interspersion of tortoise-inhabited sandhills and wetlands improves habitat quality for the indigo snakes (Landers and Speake 1980; Auffenberg and Franz 1982). Eastern indigo snakes require sheltered retreats from winter cold and desiccation (Bogert and Cowles 1947). Whenever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise (*Gopherus polyphemus*), the burrows of which shelter the indigo snakes from the winter cold and desiccating sandhills environment (Bogert and Cowles 1947; Speake *et al.* 1978; Layne and Steiner 1996). This dependence seems especially pronounced in Georgia, Alabama, and the panhandle of Florida, where the eastern indigo snake is largely restricted to the vicinity of the sandhill habitats occupied by gopher tortoises (Diemer and Speake 1981; Moler 1985b; Mount 1975). The high use of xeric sandhill habitats throughout the northern portion of the eastern indigo's range can be attributed primarily to the availability of thermal refuge afforded by gopher tortoise burrows in the winter. No such refugia is widely available off of the sandhills regions of southern Georgia and northern Florida. In wetter habitats that lack gopher tortoises, eastern indigo snakes may take shelter in hollowed root channels, hollow logs, or the burrows of rodents, armadillos (*Dasypus novemcinctus*), or crabs (Lawler 1977; Moler 1985b; Layne and Steiner 1996).

In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where the availability of thermal refugia may not be as critical to the snake's survival, especially in extreme southern Florida. Throughout peninsular Florida, the

eastern indigo snake can be found in all terrestrial habitats, which have not suffered high urban development. They are especially common in hydric hammocks throughout this region (Moler 1985a). In central and coastal Florida, eastern indigo snakes are typically found in the state's high sandy ridges. In extreme south Florida, these snakes are mainly found in pine flatwoods, pine rockland, tropical hardwood hammock habitats, and in most other undeveloped areas (Kuntz 1977). Eastern indigo snakes also use some agricultural lands (e.g., citrus) and various types of wetlands (Layne and Steiner 1996).

Even though thermal stresses may not be a year-round limiting factor in southern Florida, eastern indigo snakes seek and use underground refugia. On the sandy central and coastal ridges of south Florida, indigo snakes use gopher tortoise burrows (62 percent) more than other underground refugia (Layne and Steiner 1996). Other underground refugia used by indigo snakes include burrows of armadillos, cotton rats (*Sigmodon hispidus*), and land crabs; burrows of unknown origin; natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and in the crevices of rock-lined ditch walls (Layne and Steiner 1996). These refugia sites are used most frequently where tortoise burrows are not available, principally in the low-lying areas off of the central and coastal ridges.

Smith (1987) radio-tagged hatchling, yearling, and gravid eastern indigo snakes and released them in different habitat types on St. Marks National Wildlife Refuge in Wakulla County, Florida, in 1985 and 1986. Smith monitored the behavior, habitat use, and oviposition sites selected by gravid female snakes and concluded that the diverse habitats, including high pineland, pine-palmetto flatwoods, and permanent open ponds were important for the eastern indigo snake's seasonal activity. In this study, habitat use also differed by age-class and season; adult indigo snakes often used gopher tortoise burrows during April and May, while juveniles used root and rodent holes. The indigo snakes used gopher tortoise burrows for oviposition sites in high pineland areas, but stumps were chosen in flatwoods and pond edge habitats (Smith 1987).

Monitoring of radio-fitted indigo snakes on the central ridge of south Florida indicate that snakes in this part of the state use a wide variety of natural, disturbed, and non-natural habitat types throughout the year. On the ridge itself, indigos favor mature oak phase scrub, turkey oak sandhill, and abandoned citrus grove habitats, while snakes found off the sandy ridges use flatwoods, seasonal ponds, improved pasture, and active and inactive agricultural lands. There was no apparent selection for one habitat type over another as the use of habitats closely reflected the relative availability and distribution of the vegetation types in these areas (Layne and Steiner 1996).

In extreme south Florida (the Everglades and Florida Keys), indigo snakes are found in tropical hardwood hammocks, freshwater marshes, abandoned agricultural lands, coastal prairie, mangrove swamps, and human altered habitats (Steiner *et al.* 1983). It is suspected that they prefer hammocks and pine forests since most observations occur there, and use of these areas are disproportionate compared to the relatively small total area of these habitats (Steiner *et al.* 1983).

Reproduction: Most information on the reproductive cycle of the eastern indigo snake is from data collected in northern Florida. Here, breeding occurs between November and April, and

females deposit four to twelve eggs during May or June (Moler 1992). Speake (1993) reported an average clutch size of 9.4 for 20 captive bred females. Young hatch in approximately three months, from late May through August. Peak hatching activity occurs during August and September, while yearling activity peaks in April and May (Groves 1960; Smith 1987). Limited information on the reproductive cycle in south-central Florida suggests that the breeding and egg-laying season may be extended in south-central and south Florida. In this region, breeding extends from June to January, laying occurs from April to July, and hatching occurs during mid-summer to early fall (Layne and Steiner 1996).

Female indigo snakes can store sperm and delay fertilization of eggs; there is a single record of a captive snake laying five eggs (at least one of which was fertilized) after being isolated for more than four years (Carson 1945). There is no information on how long eastern indigo snakes live in the wild; in captivity, the longest an eastern indigo snake lived was 25 years, 11 months (Shaw 1959).

Feeding: The eastern indigo snake is an active terrestrial and fossorial predator that will eat any vertebrate small enough to be overpowered. Layne and Steiner (1996) documented several instances of indigos flushing prey from cover and then chasing it. Though unusual, indigo snakes may also climb shrubs or trees in search of prey. An adult eastern indigo snake's diet may include fish, frogs, toads, snakes (venomous and nonvenomous), lizards, turtles, turtle eggs, juvenile gopher tortoises, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner *et al.* 1983). Juvenile indigo snakes eat mostly invertebrates (Layne and Steiner 1996).

Movements: Indigo snakes range over large areas and into various habitats throughout the year, with most activity occurring during summer and fall (Smith 1987; Moler 1985b; Speake 1993). The average home range of an eastern indigo snake is 12 acres during the winter (December - April), 106 acres during late spring early summer (May - July), and 241 acres during late summer and fall (August - November) (Speake *et al.* 1978). Adult male eastern indigo snakes have larger home ranges than adult females and juveniles; their home range may encompass as much as 553 acres in the summer (Moler 1985b; Speake 1993). By contrast, a gravid female may use from 4 to 106 acres (Smith 1987). These estimates are comparable to those found by Layne and Steiner (1996) in south central Florida, who determined adult male home ranges average about 183 acres, while adult females average about 42 acres.

Status and Distribution

As stated earlier, the eastern indigo snake was listed based on population decline caused by habitat loss, over-collection for the pet trade, and mortality from gassing gopher tortoise burrows to collect rattlesnakes (Speake and Mount 1973; Speake and McGlincy 1981). At the time of listing, the main factor in the decline of the eastern indigo snake was attributed to exploitation for the pet trade. As a result of effective law enforcement, the pressure from collectors has declined, but still remains a concern (Moler 1992).

The eastern indigo snake utilizes a majority of habitats available, but tends to prefer open, undeveloped areas (Kuntz 1977). Because of its relatively large home range, this snake is

especially vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985b). Lawler (1977) noted that eastern indigo snake habitat had been destroyed by residential and commercial construction, agriculture, and timbering. He stated that the loss of natural habitat is increasing because of these threats in Florida and that indigo snake habitat is being lost at a rate of five percent per year. Low-density residential housing is also a potential threat to the species, increasing the likelihood that the snake will be killed by property owners and domestic pets. Extensive tracts of wild land are the most important refuge for large numbers of eastern indigo snakes (Diemer and Speake 1981; Moler 1985b).

Additional human population growth will increase the risk of direct mortality of the eastern indigo snake from property owners and domestic animals. Pesticides that bioaccumulate through the food chain may present a potential hazard to the snake as well pesticide use on crops or for forestry/silviculture would propose a pulse effect to the indigo snake (Speake 1993). Direct exposure to treated areas and secondary exposure by ingestion of contaminated prey could occur. Secondary exposure to rodenticides used to control black rats may also occur (Speake 1993).

The wide distribution and territory size requirements of the eastern indigo snake makes evaluation of status and trends very difficult. We believe that activities such as collecting and gassing have been largely abated through effective enforcement and protective laws. However, despite these apparent gains in indigo snake conservation, we believe that the threats described above are acting individually and collectively against the eastern indigo snake. Though we have no quantitative data with which to evaluate trends of the eastern indigo snake in Florida, we surmise that the population as a whole is declining because of continued habitat destruction and degradation. Natural communities continue to be altered for agriculture, residential, and commercial purposes, most of which are incompatible with the habitat needs of the eastern indigo snake (Kautz 1993). Habitat destruction and alteration is probably most substantial along the coasts, Keys, and high central ridges of southcentral Florida, where human population growth is expected to continue to accelerate. Agricultural interests (principally citrus) continue to destroy large expanses of suitable natural habitat in south Florida.

Even with continued habitat destruction and alterations, indigo snakes will probably persist in most localities where small, fragmented pieces of natural habitat remain. Tracts of appropriate habitat of a few hundred to several thousand acres may be sufficient to support a small number of snakes. Unfortunately, we believe that current and anticipated habitat fragmentation will result in a large number of isolated, small groups of indigo snakes. Fragmented habitat patches probably cannot support a sufficient number of indigo snakes to ensure viable populations.

One of the primary reasons for listing of the species was the pressure on wild populations caused by over-collecting for the pet trade and commerce. Since the listing of the species, private collectors have engaged in a very active captive breeding program to fulfill the desires of individuals wanting specimens for personal pets. The Service controls the interstate commerce of the species via a permit program. The Service believes that this has significantly reduced the collection pressures on the species.

Analysis of the Species/Critical Habitat Likely to be affected

The eastern indigo snake was listed in January 1978 as a threatened species primarily due to habitat loss and to over-collecting for the pet trade. The above analysis shows two items that are essential for recovery of this species: (1) acquire and/or manage habitat to maintain viable populations and (2) study their movement, food habitats, and population ecology.

ENVIRONMENTAL BASELINE

Action Area

The action area for this biological opinion is defined as all habitat within the boundaries of CCAFS.

Status of the Species in the Action Area

Florida scrub-jay: The Florida scrub-jay population on CCAFS was approximately 391 birds (126 groups) in 2007. In 2005, the scrub-jay census resulted in 308 birds (103 groups of two or more birds and nine single birds). This represents a slight net increase in groups (6) from the 2004 breeding season. The population on CCAFS was approximately 276 birds (99 groups of two or more birds and seven single birds) in 2003-2004. The number of jays decreased slightly (9 percent) from the previous year. The trend in population size over the last ten years has been downward, with an occasional increase in numbers within the ten-year study. The smaller population size was partly due to low reproductive success in 2002-2003, when breeding pairs fledged at a rate of 40 percent and 44 percent, respectively. Significant numbers of young were lost after they fledged (about 50 percent), likely due to predation. Adult survivorship was 74 percent between 2003 and 2004, which is about average for the eight years of study. Breeder survivorship was slightly higher than average (81 percent), and juvenile survivorship was above average (68 percent). Forty-seven percent of the 91 nesting groups produced young, yielding 73 juveniles by the end of the 2003-2004 breeding season (Stevens and Knight 2004).

The populations of scrub-jays occurring on CCAFS are a subset of the larger MINWR/KSC/CCAFS metapopulation. Based on the amount of existing and potentially restorable scrub habitat on the stations, CCAFS has responsibility for approximately one-third of the recovery of this metapopulation. The current INRMP for CCAFS has a goal of 300 breeding pairs of scrub-jays to be established; without continued management and restoration of overgrown scrub on the facility, this number will be impossible to reach.

As stated in the cumulative effects analysis provided by the representatives of the 45th SW, CCAFS has approximately 5,175 acres of unoccupied scrub habitat within existing management compartments. Based upon 25 acres/breeding pair of scrub-jays, restoration of these areas could result in habitat for an additional 206 breeding pairs, bringing the total to 312 breeding pairs at CCAFS, if all available habitat could be managed for scrub-jays.

The restoration of the 1157.48 acres (Table 2) will occur as part of the proposed action, which is important to the recovery of the metapopulation, as restoration of this area will link the groups of

scrub-jays found at CCAFS and KSC. Fire suppression over the years created an area of unsuitable habitat between CCAFS and KSC, and restoration of this scrub will provide habitat suitable for occupation between the two facilities. Accordingly, restoration of the habitat will allow mixing of the two existing populations, and lead to further expansion and growth of scrub-jays and their territories.

Southeastern beach mouse: The southeastern beach mouse is found along the entire reach of coastline on CCAFS in addition to the KSC and Cape Canaveral National Seashore. The known distribution is a result of cursory surveys and intermittent trapping involving different construction projects. There has been a three-year trapping study done in order to determine the status throughout its range on these Federal lands. The species is found within the action area.

Eastern indigo snake: The eastern indigo snake is likely to occur within the boundaries of the project site due to the presence of suitable habitat, although none have been seen. The eastern indigo snake standard protection measures will be used during the construction of the project.

Factors Affecting Species' Environment within the Action Area

This analysis describes factors affecting the environment for scrub-jays, southeastern beach mice, and eastern indigo snakes in the action area. There are no State, tribal, local, or private actions affecting the species or that will occur contemporaneously with this consultation. Federal actions have taken place within the action areas that have impacted Florida scrub-jays, southeastern beach mice, and eastern indigo snakes. These projects sometimes resulted in incidental take anticipated through section 7 of the Act. The impacts associated with some of these projects resulted in the loss of occupied habitat or habitat suitable for occupation within the action area.

Prescribed burning and restoration of overgrown scrub for the benefit of the scrub-jay have occurred and are ongoing on CCAFS. The Air Force continues to pursue its goal of 300 breeding pairs of scrub-jays, as outlined in their INRMP. The INRMP identifies burning and/or mechanical management of 500 acres per year. In 2007, 1300 acres of habitat were restored through a combination of control burning and mechanical treatment. At this rate of habitat management, we estimate that CCAFS will be able to reach their goal of 300 breeding pairs of scrub-jays. This goal may be achieved more quickly if existing burning constraints are reduced in the future. CCAFS has a prescribed burn working group that deals with issues of burn restrictions on CCAFS. This group meets regularly at CCAFS.

A 5-year study to compare mechanical clearing and burning to effectively manage scrub is underway and is expected to result in development of better management practices in lieu of delayed prescribed burns that have previously led to overgrown scrub-jay habitat.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and its interrelated and interdependent activities. To determine whether the proposed action is likely to jeopardize the continued existence of threatened or endangered species in the

action area, we focus on consequences of the proposed action that affect rates of birth, death, immigration, and emigration because the probability of extinction in plant and animal populations is most sensitive to changes in these rates.

Factors to Be Considered

The effects of the proposed project of the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake may occur as direct and indirect effects.

Direct Effects

The Skid Strip modification and associated facilities may result in the direct “take” of Florida scrub-jays, eastern indigo snakes, and southeastern beach mice as a result of permanent loss of 410.83 acres of sub-optimal scrub habitat. Approximately 20-acres of this are currently occupied by scrub-jays. The probability and level of incidental take is dependent upon the number of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes within the region; their ability to disperse; and the amount and distribution of available suitable habitat. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that “take” will occur.

The proposed activity will result in the direct permanent loss of approximately 20-acres of scrub habitat occupied by five groups of Florida scrub-jays totaling 12 individual birds. The proposed project will impact a portion of each Florida scrub-jay family’s territory in LMU 38, 39, 48, and 49. The proposed activity will result in the direct permanent loss of approximately 410.83 acres of sub-optimal scrub habitat over a nine-year period (FY 2009 to FY 2017) occupied by southeastern beach mice and eastern indigo snakes. The proposed project will permanently impact existing southeastern beach mouse burrows and habitat found within the project area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that “take” will occur. Similar direct effects are expected for any eastern indigo snakes occurring within the project site. Impacts to the species will be minimized by restoring 1157.48 acres of potential scrub-jay, beach mouse and eastern indigo snake habitat at CCAFS over a nine-year period.

Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone section 7 consultations, but will result from the action under consideration. The indirect effects will occur in two ways: (1) operation of the skid strip will add traffic along roadways adjacent to occupied habitat, possibly resulting in scrub-jays and snakes being struck by vehicles or (2) proposed habitat restoration and management activities are expected to enhance scrub-jay dispersal when complete.

Dreschel *et al.* (1990), Fitzpatrick *et al.* (1991), and Mumme *et al.* (2000) provide the best scientific and commercial data on the likelihood of incidental take as the result of scrub-jays

being killed by the vehicles. The only scientific documentation of road-kill mortality in Florida scrub-jays are from jays living in a territory immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory.

Indirect effects will result from continued loss of foraging habitat for the southeastern beach mouse.

The eastern indigo snake has a high probability of being impacted by increased traffic on the roads. Since a portion of their suitable habitat will be impacted by the proposed development, the snakes may have to go elsewhere and cause them to cross busy roads which could result in road-kill mortality.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

CONCLUSION

After reviewing the current status of the Florida scrub-jay, southeastern beach mouse, and the eastern indigo snake, the environmental baseline for the action area, the effects of the proposed skid strip modification and the cumulative effects, it is the Service's BO that the Skid Strip modification, as proposed, is not likely to jeopardize the continued existence of the Florida scrub-jay, the southeastern beach mouse, and the eastern indigo snake. No critical habitat has been designated for the three species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to assume and implement the terms and conditions or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agency must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. (50 CFR 402.14(I) (3))

Sections 7(b) (4) and 7(o) (2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for this species, information presented by the applicant's consultant, and other available information relevant to this action, and based on our review; incidental take in the form of harm or harassment is anticipated for five (5) Florida scrub-jay groups totaling 12 individuals.

The Service expects the level of incidental take of southeastern beach mice and eastern indigo snakes will be difficult to determine for the following reasons: eastern indigo snakes are wide-ranging and elusive; southeastern beach mice are elusive because of their burrowing habits; finding a dead or impaired specimen is unlikely; losses may be masked by predators removing dead or injured animals. The Service has reviewed the biological information for these species, information provided by representatives of the 45th SW, and has determined that incidental take in the form of harm or harassment is anticipated for all the southeastern beach mice and eastern indigo snakes utilizing the 410.83-acre area.

If during the course of this action, the project description changes, this would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and minimize impacts of incidental take of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes:

Florida scrub-jay

1. Avoid construction in scrub-jay occupied areas during the nesting season from March 1 through June 30.
2. Notify the Service of any unauthorized take of Florida scrub-jays identified during the construction of the proposed facility.
3. Ensure that prior to clearing of scrub-jay occupied habitat there is suitable habitat within 1200 feet.
4. Restore 1157.48 acres of scrub habitat within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means over the 9-year period (in addition to the 500 acres of prescribed burning per year).
5. Manage the 1157.48 acres for scrub-jays within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means.
6. Conduct scrub-jay monitoring in the restoration areas.
7. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Service for the proposed work and restoration for each year when the activity has occurred.

Southeastern beach mouse

1. Notify the Service of any unauthorized take of southeastern beach mice identified during the construction activity.

Eastern indigo snake

1. Minimize impacts to eastern indigo snakes from heavy equipment by implementing the standard protection measures.
2. Only individuals with permits should attempt to capture the eastern indigo snakes.
3. If an eastern indigo snake is held in captivity, it should be released as soon as possible in release sites approved by the Service on the CCAFS.

4. Notify the Service of any unauthorized take of eastern indigo snakes identified during the construction of the proposed facility.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

Florida scrub-jay

1. Avoid construction and/or clearing in scrub-jay occupied areas during the nesting season from March 1 through June 30.
2. Unauthorized take of scrub-jays associated with the proposed activity should be reported immediately by calling the Jacksonville Field Office of the U.S. Fish and Wildlife Service in Jacksonville at 904-232-2580. If a dead Florida scrub-jay is found on the project site, the specimen should be thoroughly soaked in water and frozen for later analysis of cause of death or injury.
3. If there is no suitable habitat within 1200 feet of the proposed cleared areas that are occupied by scrub-jays, the 45th SW will conduct restoration in LMUs adjacent to the impact areas prior to any clearing activities.
4. The 45th SW will restore 1157.48 acres of scrub habitat within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means over the 9-year period (this will occur in addition to the 500 acres of restoration per year using mechanical treatment followed by controlled burning).
5. The 45th SW will manage the 1157.48 acres of scrub habitat for continued scrub-jay use of the created corridors within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means (this will occur in addition to the 500 acres of restoration per year using mechanical treatment followed by controlled burning).
6. Conduct scrub-jay monitoring to demonstrate that the impacted birds successfully use the restoration areas and these areas are successful in creating corridors and providing habitat for those birds displaced by the proposed project. Color band scrub-jays occupying habitat to be cleared and monitor their dispersal and habitat use following vegetation clearing at impact sites. Monitoring should continue until such time that it is determined that impacted scrub-jays have established new territories, joined scrub-jay families with existing territories, or have died.

7. A report describing the project conducted during the year and actions taken to implement the reasonable and prudent measures and terms and conditions of this incidental take statement shall be submitted to the Service for each year of completing the proposed work and restoration. This report will include acreage cleared, location of clearing, acreage of LMU restored, and a scrub-jay monitoring report in the restoration areas.

Southeastern beach mouse

1. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

Eastern indigo snake

1. An eastern indigo snake protection/education plan shall be developed by the 45th Space Wing for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:
 - a. A description of the eastern indigo snake, its habits, and protection under Federal Law;
 - b. Instructions not to injure, harm, harass or kill this species;
 - c. Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
 - d. Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, and then frozen.
2. Only an individual who has been either authorized by a section 10(a) (1) (A) permit issued by the Service, or authorized by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.
3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the Jacksonville Field Office within 60 days of the conclusion of clearing activity. The report should be submitted when any eastern indigo snakes are observed or relocated. The report should contain the following information:
 - a. Any sightings of eastern indigo snakes;
 - b. Summaries of any relocated snakes if relocation was approved for the project (e.g., locations of where and when they were found and relocated);
 - c. Other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.
5. If a dead eastern indigo snake is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

These reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than five groups of Florida scrub-jays utilizing the 20-acre area will be incidentally taken, and all the southeastern beach mice, and all eastern indigo snakes utilizing the 410.83-acre of sub-optimal scrub habitat will be incidentally taken over the nine-year period. If, during the course of the action, this level of incidental take is exceeded (e.g., burning restrictions placed on scrub habitat adjacent to the skid strip modification and associated facilities, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to use their authority to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

1. Leave and use native scrub vegetation in landscaping around the retention areas and the right-of-way to provide scrub habitat for the scrub-jays utilizing the site.
2. Signs should be placed on the fences that explain to the occupants the importance of the onsite and adjacent scrub areas for the listed species.
3. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation measures.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the Air Force's action is later modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this BO, the incidental take would be exceeded when the take exceeds five (5) groups of Florida scrub-jays utilizing the 20 acres of scrub, and all the southeastern beach mice and eastern indigo snakes utilizing the 410.83 of sub-optimal of scrub habitat over the nine-year period, which is what has been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the Air Force during this consultation. We would like to continue working with you and your staff regarding the Skid Strip modification project. For further coordination please contact Ann Marie Lauritsen at (904) 525-0661 of this office.

Sincerely,



David L. Hankla
Field Supervisor

cc: Mike Jennings-FWS/JAXFO
Downie Wolfe-FWS/JAXLE
Annie Dziergowski- FWS/JAXFO
Ken Graham- FWS/Atlanta RO

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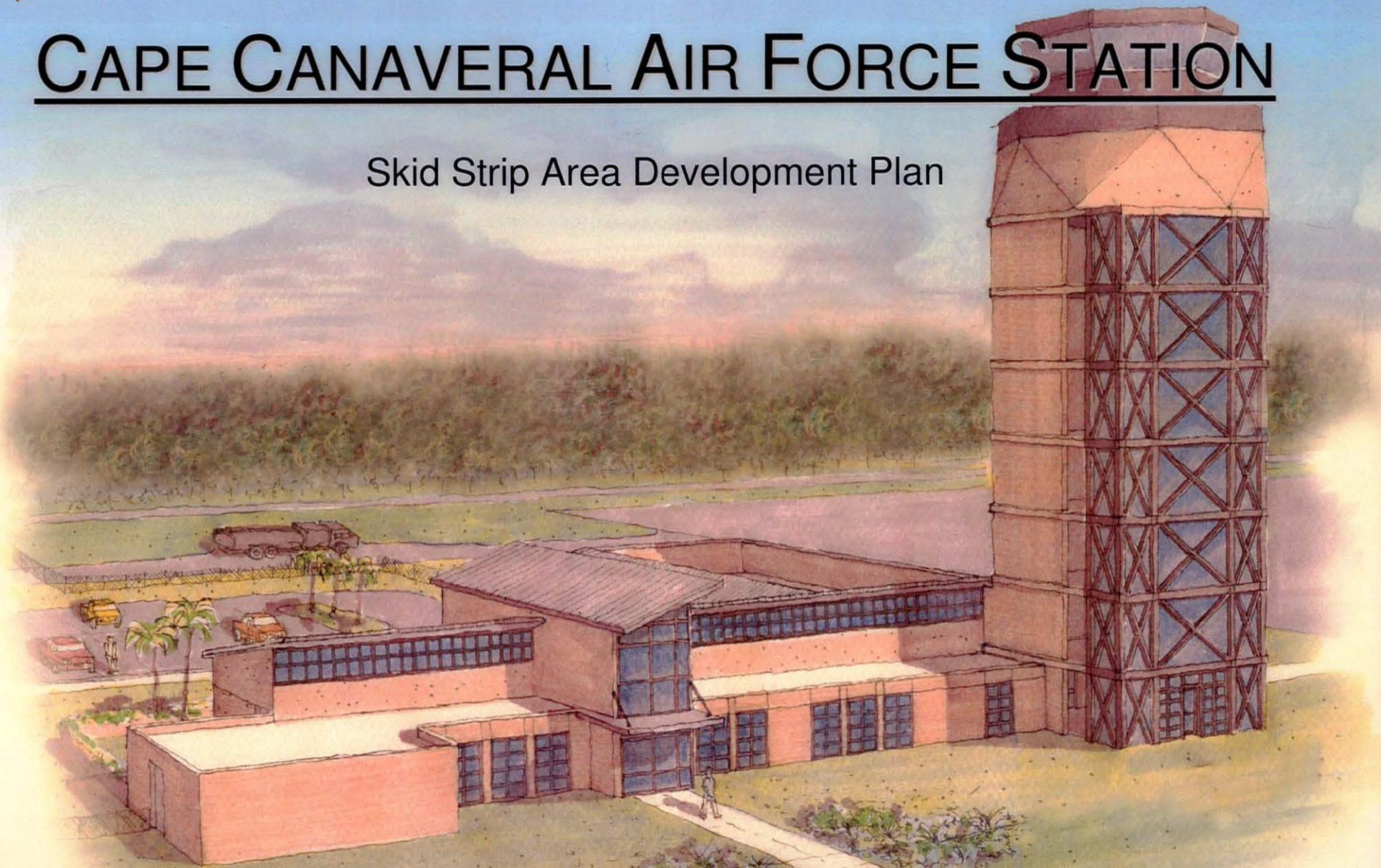
Appendix C

Skid Strip ADP



CAPE CANAVERAL AIR FORCE STATION

Skid Strip Area Development Plan



Cape Canaveral Air & Space Complex

Executive Summary

Through the years the Cape Canaveral Spaceport has been on the leading edge of innovation, but changing technology and aging infrastructure have exposed weaknesses and safety violations that challenge Cape Canaveral Air Force Station's (CCAFS) ability to meet the needs of existing and future missions. The Skid Strip Area Development Plan (ADP) addresses these challenges through a two-phased approach: 1) Capitol Improvements Projects that address short-term and mid-range needs designed to increase safety, and 2) MILCON projects for long term needs, developed to support the existing and future 45th SW missions.

This ADP focuses on the structural condition of the Skid Strip apron, ATCT, and the Ops Flight Planning Facility in order to determine their suitability for the existing and future missions. Apron pavement and sub-base conditions, safety violations, and expansion restrictions reveal the limitations of the apron and adjacent facilities.

Thirty-six projects are recommended in this ADP to address these limitations and enhance safety by reducing violations and building the Cape Canaveral Air & Space Complex. Designed to improve safety and correct facility deficiencies, the Capitol Improvement projects will enhance the existing mission while the MILCON projects build long-term solutions to respond to future mission needs. Thirty short-term projects have been programmed for a total of [REDACTED] and six long-term MILCON projects have been developed for a total of [REDACTED]. All of the projects recommended in this ADP comply with both the long and short-term visions of the future established in the Cape Canaveral Spaceport Master Plan (CCSMP) and the Cape Canaveral Air Force Station (CCAFS) General Plan.

Positioning CCAFS to meet all future missions will require a proactive stance in a changing environment, which is not possible with the existing facilities. The proposed Cape Canaveral Air & Space Complex includes a new Air Traffic Control Tower (ATCT), Airfield Management Operations building (AM Ops), Aircraft Apron, Parallel Taxiway, Hazardous Cargo Pad, Maintenance Apron and Hangar. The future is transitioning from high-cost, specialized

launch pads to reduced-cost, re-usable horizontal launch vehicles. The Pegasus, the Space Shuttle and the X-Prize winner reflect this transition. The Cape Canaveral Spaceport must exploit its unique position as a full-service spaceport and as the only spaceport in the world capable of launching a payload either vertically or horizontally. But, in order to be successful, CCAFS must begin planning and building for tomorrow today.

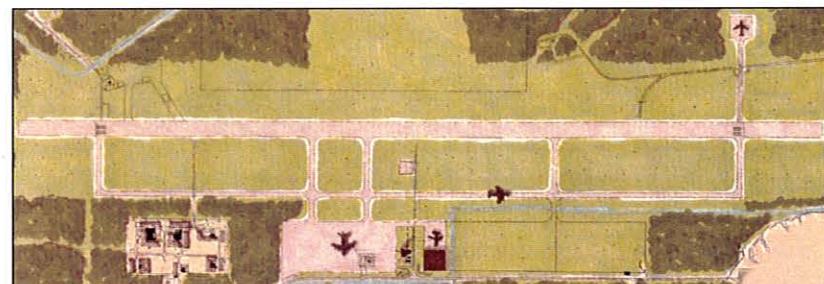


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1. Introduction

The existing Cape Canaveral Skid Strip and airfield support facilities are not compliant with Air Force instructions or the goals and objectives of the CCSMP and the CCAFS General Plan and are non-compliant with lighting, design and safety regulations found in the following Air Force regulations:

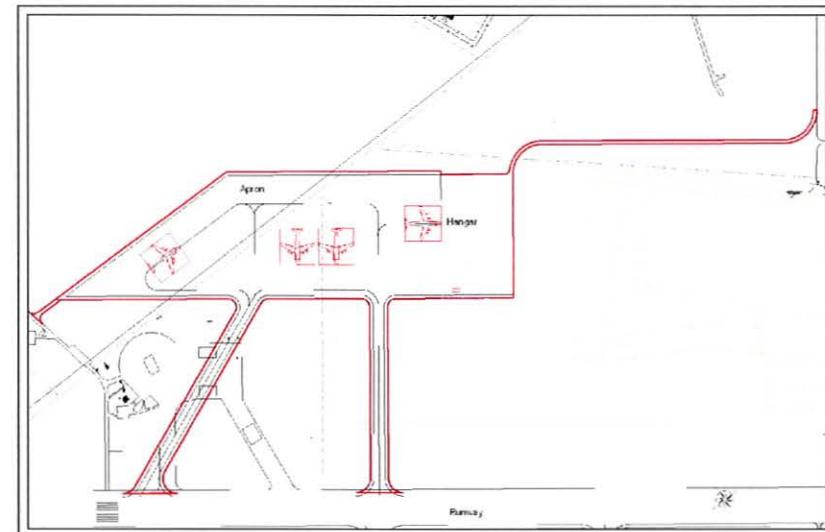
- Unified Facilities Criteria 3-260-01 Airfield and Heliport Planning and Design;
- AFH 32-1084 Facility Requirements Handbook;
- AFMAN 32-1076 Visual Air Navigation Facilities;
- AFI 32-1042 Standards for Marking Airfields;
- FAA Advisory Circular 150/5345-12C Specification for Airport and Heliport Beacon.

This ADP focuses on the non-compliant facilities, and proposes a corrective action plan.

1.1 Background

In 1952 the Skid Strip was built as a Missile Landing and Test Facility (Category Code 390-551). By 1994 it was realized that the Skid Strip was functioning primarily as a runway and should be recognized as such. The real property category code for the Skid Strip was changed to airfield (111-111) and the Skid Strip was evaluated against the appropriate guidance. Serious safety violations were identified and this ADP was developed to correct these deficiencies and brings the Skid Strip into compliance.

Phase I identified approximately 800 obstructions. A thorough analysis was conducted resulting in the immediate correction of some of the obstructions. The remaining obstructions were grouped together and 19 new waiver packages were written and delivered to Air Force Space Command (AFSPC) and approved 09/17/2004. This process also identified the need for an Aircraft Parking Plan, which was developed, approved and installed on the existing Skid Strip Apron. The Aircraft Parking Plan, which allows three C-5's, or Antonov's to park on the Skid Strip apron with a wingtip separation distance of 30 feet was granted an airfield waiver. (The normal wingtip separation distance is 50 feet.)



Cape Canaveral Air and Space Complex - North Option

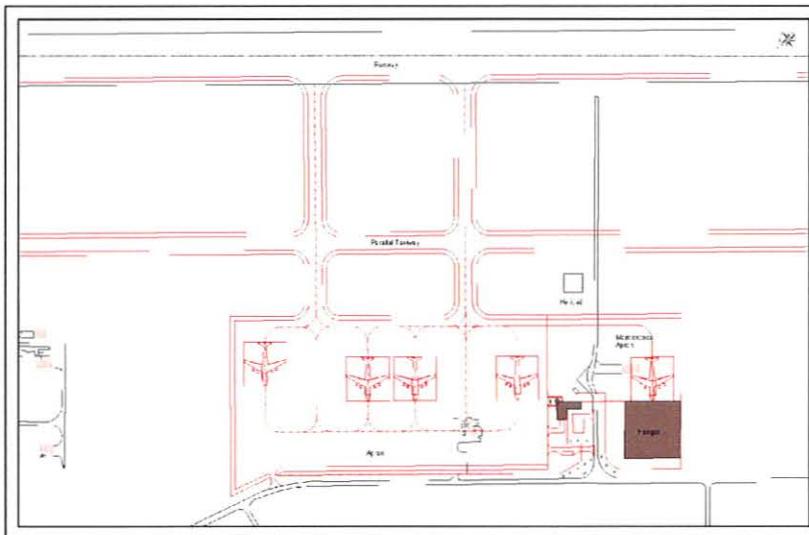
Also during Phase I, two apron and facility layouts were developed. Each layout option complied with the following specifications:

- Apron sized to accommodate four "heavies" (C-5's or Antonov's) with all required minimum clearances,
- AM Ops facility sized for current mission plus space for an Airfield Manager and a private Distinguished Visitor (DV) restroom,
- ATCT size and height per UFC 3-260-01 criteria, and the Facility Requirements handbook (AFH 32-1084).
- An optional hangar and maintenance apron sized for a single Antonov or C-5.

An evaluation of the future land use requirements taken from the CCSMP indicated that neither option would prevent the use of the land surrounding the Skid Strip as a Horizontal Launch, Horizontal Recovery (HLHR) facility.

Further review of the CCSMP and the CCAFS General Plan ensured ADP compliance with all adopted short and long-range planning goals and objectives. The CCAFS General Plan, a short-range planning document, discusses growth and planning strategy

for the next 20 years. The CCSMP, a long-range planning document, envisions strategic planning for the next 50 years. Together they provide the basis for the Skid Strip Area Development Plan.



Cape Canaveral Air and Space Complex – South Option

Phase II of the ADP developed an implementation strategy through programmed Capitol Improvement projects (Sustainment, Restoration and Modernization or SRMC) and MILCON construction projects. The first task for Phase II was to evaluate the potential locations for the Cape Canaveral Air & Space Complex and select the best location. The next task was to develop projects and prioritize them using a combination of risk analyses measures, which include:

- Airfield Priority Areas (PA),
- Operational Risk Management Assessment (ORM),
- Risk Assessment Code (RAC),
- Cost Effectiveness Index (CEI),
- Adjusted Priority Number (APN).

A complete discussion of these analyses and the resulting project priorities are covered in Appendix 3.

Through a series of meetings and presentations detailing the opportunities and constraints placed on each of these two sites, Air Force leadership reviewed and evaluated the two locations and has determined that the Cape Canaveral Air & Space Complex - South Option best satisfies the needs of the existing mission while not precluding the established vision of the future.

2. Goals & Objectives

Three major goals have been adopted from the CCAFS General Plan for use in this ADP. These are:

- Continual Improvement Toward Mission Excellence,
- Continual Improvement in Protection of the Natural and Human Environment,
- Continual Quality of Life Improvement.

These goals and their corresponding objectives will enhance safety, meet the needs of the existing mission, and develop CCAFS' image as the world's premier spaceport while allowing CCAFS to successfully meet future missions.

Goal 1 – Continual Improvement Toward Mission Excellence

Objective 1.1 –Site & develop facilities for optimal accomplishment of the launch mission

Objectives

Objective 1.2 – Improve infrastructure to support mission growth

Objective 1.3 – Improve and modify facilities to better serve future launch customers

Objective 1.4 – Enhance compliance with the 45th SW Facilities Excellence Plan Architecture Guidelines

Goal 2 - Continual Improvement in Protection of the Natural and Human Environment

Objective 2.1 – Pursue all potential pollution prevention opportunities

Objective 2.2 – Minimize the destruction of endangered and/or threatened species habitats

Goal 3 – Continual Quality of Life Improvement

Objective 3.1 – Enhance Safe Working Conditions for the CCAFS work force

Objective 3.2 – Provide a morale-enhancing work environment for the work force

3. Analysis of Existing Facilities

This section discusses each of the facilities surrounding the apron, including the apron itself in relation to its age, condition, adherence to criteria, status of any airfield waivers, service to the existing mission and potential use for future missions as reflected in the adopted goals of the General Plan.



The existing Skid Strip Apron, Ops Flight Planning and ATCT

In the summer of 2004, the Skid Strip runway was narrowed and resurfaced. At that time, runway lighting violations were corrected and fixtures were upgraded eliminating multiple airfield obstructions. As part of this project, the taxiways were lengthened and painting violations were corrected. Minor taxiway lighting violations remain, and the shoulders on Taxiway Alpha are 5' too narrow, but temporary and permanent airfield waivers have been written and approved that address these deficiencies.

3.1 Skid Strip Apron

The Skid Strip Apron is adjacent to the Ops Flight Planning Building and the ATCT. The apron suffers from age, limited size, and non-compliance with existing airfield criteria. When the Skid Strip apron was built in 1955, it was a circular pad with a single taxiway leading to the runway. In 1963 the Army Corps of Engineers expanded it, and a second taxiway was added. The apron was not designed to accommodate the numerous large body aircraft that regularly deliver cargo to the Skid Strip. As a result, ramp space is very limited, and safety is a concern. The Apron has three airfield waivers: one for minimum wingtip separation distances RAC 2(II B); one for parking aircraft inside of the primary and transitional surfaces, RAC 3(I D); and one for no paved apron shoulders RAC 4 (III C). Apron expansion is possible at this site, but undesirable due to the location of above ground drainage structures, and its location in the primary and transitional surfaces.



Runway 13 Looking East to the Landfill

Another factor limiting expansion is the location of the construction and debris landfill. Any eastward expansion of the apron would significantly reduce the lifespan of the landfill, requiring either siting a new landfill, instituting a Memorandum of Agreement (MOA) with NASA to use their landfill, or trucking waste to the Brevard County landfill.



An example of pavement failure at Textron's Airfield

As was mentioned above, the Army Corps of Engineers designed and built the apron expansion early in the 1960's. As a cost saving measure, the Corps used millings from the runway for the sub-base. Unlike lime rock, the typical sub-base, asphalt compresses under weight. This becomes a problem when large body planes park overnight: the weight of the plane compresses the subsurface asphalt and creates a hole, from which the plane must be towed out. As a solution, concrete pads were installed at three locations on the apron and at one location on Taxiway Bravo. While solving the immediate concern a second problem was created, parking options were limited. Surface pavement evaluations have concluded that the West and Central parts of the apron are limited in maximum weight and passes, and have a corresponding PCN of 25, which indicates degraded pavement. The apron is expected to need resurfacing within 10 years.

Cargo unloading space on the Skid Strip apron is also limited. C-5s and Antonovs park on the western most concrete pad and cargo is off loaded down taxiway Alpha. This closes the apron and the taxiway to other traffic. In addition, the plane, the cargo, the cranes and the other unloading equipment are all inside of the primary surface and are obstructions to flight safety.



View of the Apron and Taxiway Alpha Looking West



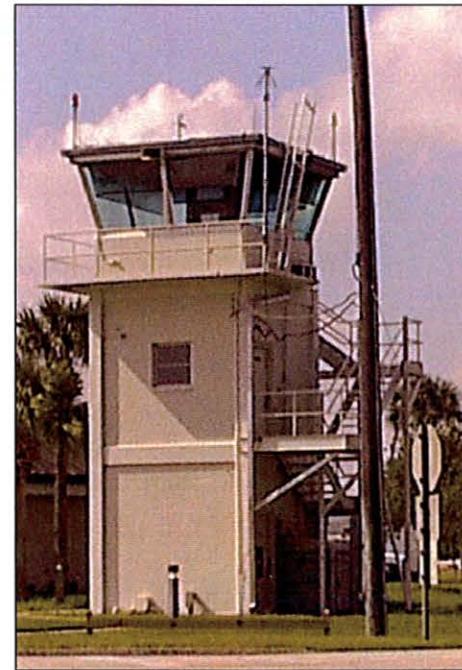
View of Antonov from Taxiway Alpha

In summary, multiple constraints exist on the Skid Strip apron these are; small size requiring an airfield waiver, location inside the primary surface, also requiring a waiver, limited expansion

opportunities, and pavement condition. The Skid Strip Apron minimally serves the existing mission, but its sub-base and pavement condition will require major renovation in the near future. When the apron is due for resurfacing it should be brought up to meet operational, structural, and flight safety requirements. Therefore resurfacing the apron at the existing location is ill advised because of the apron's limited space, expansion capability, and location inside the primary surface. Together, these constraints suggest that a new location would better serve the needs of CCAFS.

3.2 Air Traffic Control Tower (ATCT)

The existing Air Traffic Control Tower is located near the approach end of Runway 13, 185 feet east of the extended threshold, and 827 feet north of the runway centerline. The ATCT exhibits multiple inconsistencies with the current guidance. First, the ATCT faces the runway to the Southeast, looking into the sun. The preferred orientation for all ATCTs, according to UFC 3-260-01, is first North, then East, then West and last South. Second, the ATCT was not built in the optimal location, which should have been midfield to ensure runway end visibility for the controller. Third, the ATCT is too short. At a height of 46 feet, the ATCT is 59.5 feet under the recommended height of 105.5 feet for its location on the runway. An elevated tower increases the controller's ability to recognize anomalies and make necessary corrections. Fourth, the tower cab size is too small. Its recommended size, by both the UFC and the AFH for Facility Requirements, is 544 sq. ft.: the floor size of the Skid Strip's tower cab is 240 sq. ft. As a result of either the small cab size, the age of the tower or the limited operations, many of the instruments normally required in an Air Force control tower are absent. But, as the recent ATSEP inspection will verify, this lack of equipment does not negatively impact the function of the existing mission. However, the lack of space and the antiquity of the existing equipment would necessitate replacement or upgrade prior to any mission change or operational increase.



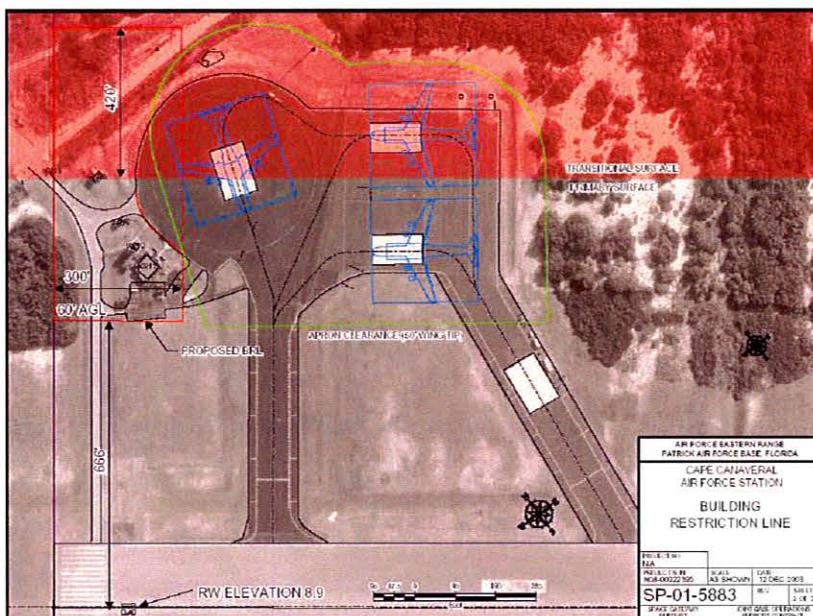
Existing Air Traffic Control Tower

Beyond the concerns of location, height and size discussed above, safety is the ultimate concern. The ATCT is inside of the Primary Surface, less than 1,000 feet from the runway centerline, but due to the Building Restriction Line (BRL) no airfield waiver is required. The BRL is an imaginary line drawn parallel to the runway behind which all existing buildings are exempted from obtaining an airfield waiver. 45th SW Civil Engineering has adopted the BRL to reduce the number of airfield waivers required. However, the BRL does not negate the criteria by which the waivers were needed in the first place. As such, the ATCT is an obstruction to the primary surface. Recent RAC analyses have determined that the ATCT is a flight safety hazard to arriving and departing aircraft; and prior to the adoption of the Apron Clearance Line and the installation of the taxi line, it was considered a hazard to aircraft on the apron (RAC 2) as well. Therefore, the existing tower is poorly located at the end of

the runway, inside the primary surface, smaller than recommended and too short for optimal viewing of the far end of the runway.

Also, the Skid Strip Air Traffic Control tower does not support the adopted goals and objectives of the General Plan. Specifically, the tower:

- Does not serve Goal 1, Continual Improvement Toward Mission Excellence.
- Is not located for optimal accomplishment of the launch mission (G1, O1.1),
- Does not support mission growth (G1, O1.2),
- Will not adequately serve future launch customers (G1, O1.3),
- Does not satisfy Goal 3, Continual Quality of Life Improvement.



The BRL, New Apron Clearance Line and Parking Plan

The location of the tower inside the primary surface does not enhance safe working conditions (G3, O3.2). Therefore it can be seen that the ATCT, through an analysis of the adopted goals, and the other issues, like orientation, location, height, size, equipment

and safety, does not adequately or safely support the current mission. Nor can it be said that the ATCT can successfully respond to a changing mission and serve the 45th SW into the 21st Century.



Runway 31 on Approach Looking West

3.3 Ops Flight Planning Building

The Ops Flight Planning Building suffers from some of the same problems as the ATCT, including:

- Insufficient size and problematic location,
- Inadequate DV facilities,
- Hazard to flight safety.

The recent staff addition of a permanent Airfield Manager revealed the limitations inherent in the size of the Ops Flight Planning Building. The current configuration of the building contains one small office, which has been traditionally assigned to the Air Traffic

Controller. This space also doubles as the office for the part-time aircraft servicer and as a makeshift kitchen/break room and weather center. Recent renovations converted what had been a second office into a needed DV lounge.

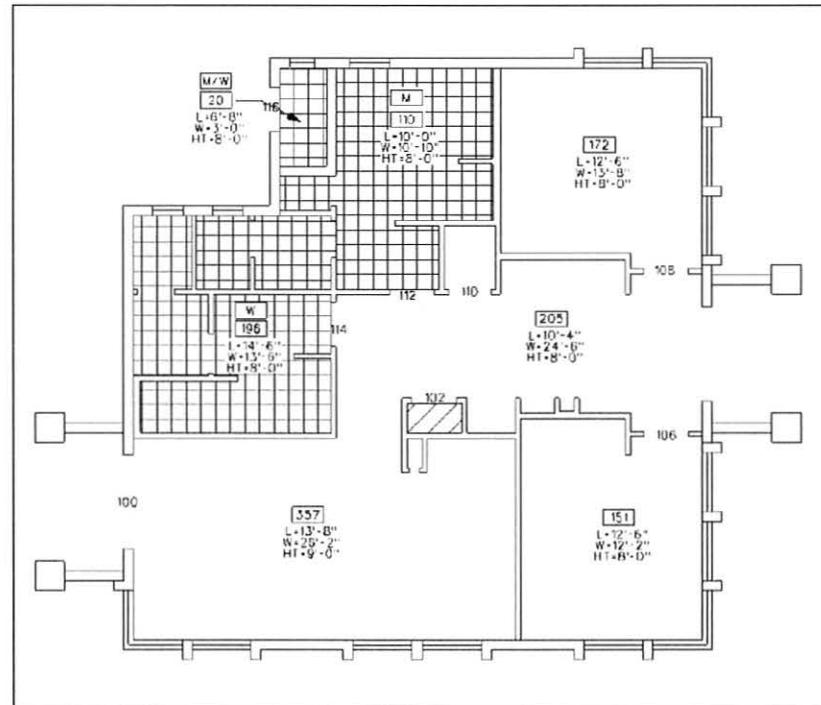


Operations Flight Planning Facility

Like the ATCT, the location of the Ops Flight Planning Building is a hazard to flight safety. The Skid Strip Operations Flight Planning Building is located exactly 750 feet from the runway centerline, inside the primary surface and too close to the apron resulting in a Risk Assessment Code of 2 (meaning a serious danger). In addition, all parking, landscaping and utility connections are on the runway side of the facility, making the functional distance from the runway to the Ops Flight Planning Building approximately 650 feet. Like the ATCT, the Ops Flight Planning Building is behind the proposed BRL and as such does not require an airfield waiver. However, the Ops Flight Planning Building is still considered a potential hazard to arriving and departing aircraft.

The Ops Flight Planning Facility is over 7,000 sq ft smaller than recommended by Air Force Guidance. The space allowed by Air Force facility design guidelines (8,715 sq. ft.) In the past the Skid

Strip Ops Flight Planning building was minimally adequate for the existing mission. But now a building addition will be required to meet the needs of the daily operations, house the Airfield Manager and accommodate a new DV Restroom. A project has been programmed to meet these needs, but should be evaluated against the risk (RAC 2) and future MILCON construction projects.



Interior of the Operations Flight Planning Facility

Also, building expansion for future operations and missions is limited by the lack of space in the facility. This prevents additional equipment or personnel from being stationed at the airfield, and would inhibit expansion within this facility for future missions.

Many distinguished visitors begin their spaceport visit at the Skid Strip. A recently renovated DV Lounge, in combination with the installation of a DV Marquee and the painting of a red "carpet" on the apron welcomes CCAFS visitors. However, some simple facts

remain. Aircraft ground equipment is stored outside and is visible to all DV's arriving by air or by car. In the following photo, four portable fire extinguishers, chocks, two portable generators, a golf cart and the portable staircase can be seen from the front of the building and from the newly painted DV Red Carpet. An aged portable guard shack is located at the front gate, and electrical boxes and a generator tank are visible next to the UPS facility. The UPS facility. The



DV Marquee

Skid Strip facilities do not do justice to CCAFS as the premier gateway to space.



Aircraft Ground Equipment

The Ops Flight Planning Building does not support the adopted goals and objectives of the General Plan. Like the ATCT, the Ops Flight Planning Building does not serve Goal 1, Continual Improvement Toward Mission Excellence. The building is not located for optimal accomplishment of the launch mission (G1, O1.1); it does not support mission growth (G1, O1.2); it will not

adequately serve future launch customers (G1, O1.3). Neither does the facility satisfy Goal 3, Continual Quality of Life Improvement nor does the location of the Ops Flight Planning Building, inside of the primary surface, enhance safe working conditions.

In summary, the Ops Flight Planning Building is inadequate for the existing mission, unlikely to be suitable for an expanded mission, and without the BRL, would be a violation to airfield criteria.

4. Alternatives

Three alternatives are offered as solutions to the identified deficiencies of the existing facilities.

Alternative 1 – Status Quo

The first alternative is to do nothing. Continue to maintain the airfield waivers and submit the annual waiver package for approval. Permanent waivers not annually approved will require a project for correction.

Alternative 2 – Reduce Airfield Waivers

The second alternative is completing all of the SRMC programmed projects (not including the MILCON projects) identified and phased through Phase II of this Skid Strip ADP project.

Alternative 3 – Build the Cape Canaveral Air & Space Complex

The final alternative is completing all of the SRMC programmed projects and funding and completing all MILCON projects

5. Pros and Cons

Potential opportunities and constraints are offered for each of the alternatives to fully convey the consequences of choosing any of the three options.

5.1 Analysis of Alternative 1

Alternative 1, "Status Quo" - record all airfield obstructions through airfield waiver packages and submit annual waiver package. Program projects for obstructions not granted a waiver.

5.1.1 Pros

The upside of choosing this alternative is that it is already complete. All identified obstructions have been noted through airfield waivers and the 2004 annual waiver package has been approved. Future costs are limited to writing additional waivers and programming projects as the need arises.

5.1.2 Cons

The downside of choosing this alternative is twofold. First this alternative presumes that the safe history of operations on the airfield predicts a safe future, and it does not strive to achieve any of the goals adopted through the General Plan. Second, this alternative does not correct any obstructions, does not enhance safety, does not improve mission infrastructure to support mission growth and does not assist in accomplishing the mission. This option does not comply with AF guidance provided in UFC 3-260-01 "A2.2.2.1.1. Establish temporary waivers for correctable obstructions. Temporary waiver requests must indicate the action planned to correct the violation and an estimated completion date."

5.2 Analysis of Alternative 2

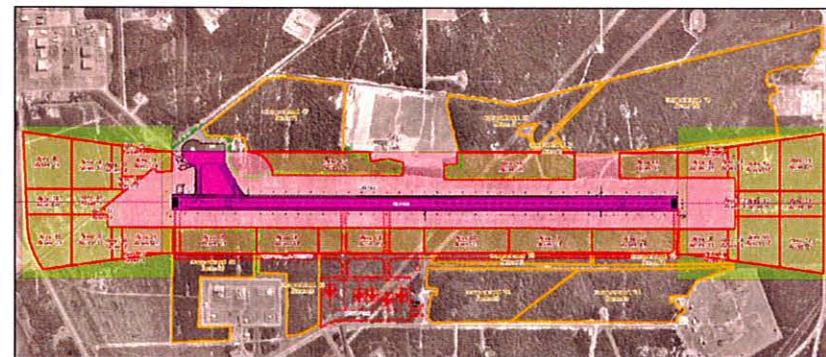
Alternative 2, "Reduce Airfield Waivers" - complete all of the projects identified and phased through the Skid Strip ADP project (not including the MILCON projects). See Table 1 in Section 7 for projects and costs.

5.2.1 Pros

This option increases safety, increases the ability to meet the needs of the existing mission, and increases environmental compliance through Scrub Jay Habitat creation. This alternative does increase safety for personnel, payloads, and equipment at the Skid Strip. Completion of all SRMC projects programmed in Phase

I of the Skid Strip ADP will correct all on-airfield obstructions requiring waivers. A discussion of the projects and their benefit to the Skid Strip follows.

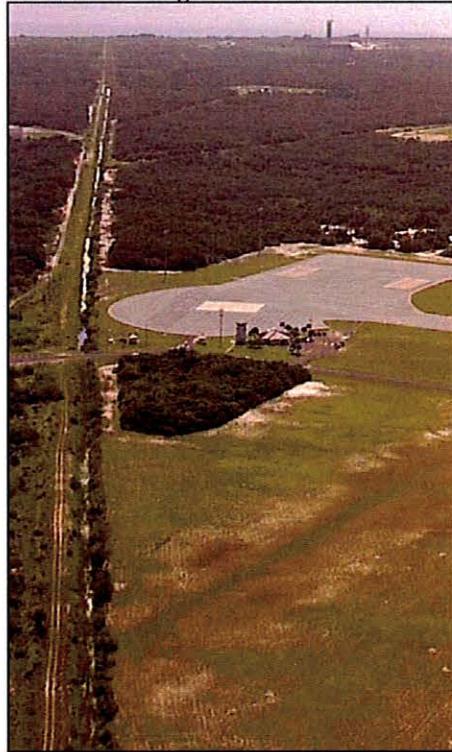
- **Clear Trees** – Eleven individual projects have been created to remove all of the trees inside of the airfield surfaces, and to create Scrub Jay habitat in surrounding areas. These projects target close-in trees that violate the airfield surfaces and require NOTAMS or Trouble T's to be published with the Federal Aviation Administration (FAA). This project specifically addresses Objectives 2.2 and 3.1 - minimize the destruction of endangered and/or threatened species habitats and enhance safe working conditions. Clearing and restoring all the areas below in red and yellow will create Scrub Jay Habitat and contract changes will be put in place to maintain all areas as required as open space habitat or nesting habitat.



Scrub Jay Habitat Creation Areas

The Fish and Wildlife Service (FWS) and Air Force Environmental 45 CES/CEVP have provided preliminary concurrence with these projects. Final concurrence will be granted once 45CES/CEVP prepares and submits a Biological Assessment to the U. S. Fish & Wildlife Service and FWS issues their Biological Opinion. In addition to creating Scrub Jay Habitat, these projects will remove trees that are creating an obstruction requiring an airfield waiver, therefore increasing safety, and satisfying two goals from the General Plan.

- Re-route the ditch through the Clear Zone – Two projects have been created to re-route or culvert the ditches that intersect the Clear Zone. The ditch on the west end needs to be re-routed as it is inside of the graded area of the clear zone and inside of the area of frangibility.



Ditch in the Clear Zone

The ditch on the east end needs to be enclosed in a culvert where it passes through the zone of frangibility. These projects will improve the safety of the runway for the accomplishment of the launch mission (O 1.1), will improve and modify facilities to best serve future launch customers (O 1.3), and will enhance safe working conditions for the CCAFS work force (O 3.1) and will eliminate one airfield waiver.

- Gates and Bollards – Once Scrub Jay Habitat is restored, the existing gates and bollards that prevent access to the runway will need to be moved to their sited locations. Moving these

obstructions will eliminate an airfield waiver and enhance safe working conditions for the CCAFS work force (O 3.1)

- Fence the Skid Strip – A single project has been proposed to fence the exposed areas of the Skid Strip as a result of the tree removal projects. This project will increase safety for personnel and pilots by reducing the risk of an airfield incursion by unauthorized vehicles (O 3.1).
- Camera Pad – An abandoned camera pad is located at the approach end of Runway 13 and inside of the primary and

transitional surfaces and the graded area of the Clear Zone. This camera pad is slated for demolition, which will remove one airfield obstruction requiring a waiver and will comply with the safety goals and objectives of the General Plan.

- Fire Hydrants in the Primary Surface - Five fire hydrants are inside of the primary surface and are considered a violation to airfield criteria requiring a waiver. Flush mount or remove these hydrants to increase safety and to comply with Air Force criteria and goals (O 3.1).
- Rotating Beacon – Install an Airfield Rotating Beacon to increase safety on the airfield and to comply with Air Force directives (O 3.1).
- Area Warning Lights – Lower or relocate the airfield warning lights outside of the transitional surface to comply with the UFC 3-260-01. This project will increase safety on the airfield by removing an obstruction to landing and departing aircraft (O 3.1).
- Cruciform Foundations – Install cruciform foundation for the Mobile Aircraft Arresting Unit used in conjunction with the bi-annual Navy F-15 test program. Installation of these foundations will enhance safety for the Navy. The project will eliminate the need to write a bi-annual temporary waiver package and remove the need to disturb the runway shoulders to bury the anchors.
- Signs Around the Airfield – Remove improperly located signs around the airfield that will be further exposed through the habitat restoration projects. Re-install controlled area signs as appropriate, at new locations. Completion of this project will increase safety and eliminate an airfield waiver in compliance with 45th SW goals and objectives.
- Grade and Sod to 500 feet – Two projects have been created to redress the violations to the lateral clear zone. These projects, when complete, should standardize grading to criteria, and may eventually eliminate the need for an airfield waiver.
- Paved Overruns and Approach Lights – Four projects have been created to install paved overruns and correct or install standard approach lighting. Currently the Skid Strip's approach lighting is in violation to standard lighting criteria. These projects will increase safety and eliminate two airfield waivers.

- ATCT Radio Antenna and Osprey Nest Pole – Remove or relocate the wooden pole that supports the ATCT radio equipment. Positioned inside of the primary surface, this pole seasonally supports an osprey nest and creates a potential Bird Air Strike Hazard (BASH). Modify pole to prevent future nesting, relocate pole and/or relocate the ATCT equipment. This will eliminate one airfield waiver and increase safety on the apron.
- Install Apron Shoulders - The Skid Strip Apron is too small for the existing mission. It is relatively common for as many as three C-5s to arrive with rocket segments or payloads at the same time. This has resulted in a wingtip clearance violation and required an airfield waiver. First, add paved shoulders as far out as possible without impacting the large drainage ditch (required width is 25'). Second, install culverts in all small drainage swales adjacent to the apron. Third fill and grade the surrounding dirt to the grading criteria to the maximum extent possible. These changes will reduce the level of risk associated with two pending airfield waivers, but will not eliminate them. Last, establish procedures to limit the Maximum on Ground (MOG) aircraft to three in accordance with the parking plan. Completion of this project will enhance safe working conditions for pilots on the apron (O 3.1).
- Operations Flight Planning Building - Like the Skid Strip apron, the Ops Flight Planning Building is too small. In the existing building two offices are required but only one is provided. Likewise for the DV facilities, a private restroom is required, but not available. In the short-term it is recommended that the Ops Flight Planning receive a building addition and be remodeled. A small addition off of the north side of the building will allow for a DV restroom and add the required office space. This addition will support objective 1.1 and will better enable the Skid Strip to accomplish its current mission.

5.2.2 Cons

While completing all of the projects programmed for the skid strip will ultimately increase safety and improve, in the short-term, the abilities of these facilities to support the existing mission, but long-term problems remain. This alternative will not eliminate the hazards to flight safety caused by the ATCT, Ops Flight Planning Building or parking aircraft on the apron. The CCAFS General Plan

adopted in June 2002 set out 4 goals necessary for a successful transition into the future. Three of these goals directly relate to this ADP. They are: Continual Improvement Toward Mission Excellence; Continual Improvement in Protection of the Natural and Human Environment and; Continual Quality of Life Improvement. From these goals there are 8 essential objectives that are indicators to be used when determining a future course of action. Alternative 2 fails to address any of these objectives. For example; once the addition is built on to the Ops Flight Planning Building, it still will not support mission growth or serve future launch customers (O 1.2, O 1.3). The existing Skid Strip facilities will still be in violation inside of the primary surface and the ATCT will still be too short and too small. Also, this option does not enhance compliance with the 45th SW Facilities Excellence Plan.

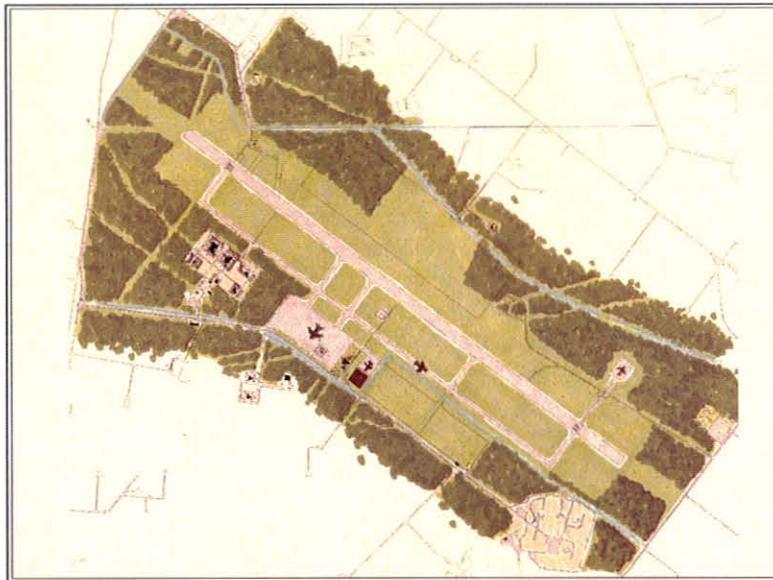
Probably the most important objective that is not met by Alternative 2 is "Improve and modify facilities to best serve future launch customers". Alternative 2 does not set the stage for the future or for potential Horizontal Launch Horizontal Recovery (HLHR) vehicles. Being proactive in a changing launch vehicle environment will assist CCAFS in meeting the 45th SW vision of being the premier gateway to space.

5.3 Analysis of Alternative 3

"Build the Cape Canaveral Air & Space Complex" and complete all SRMC programmed projects.

5.3.1 Pros

Alternative 3 eliminates every on-airfield safety violation and eliminates all waivers inside the primary and transitional surfaces. Alternative 3 also meets all facility requirements, including minimum wing-tip separation distance on the Apron; and height, size and location of the ATCT and AM Ops facility. In addition, the location of the facilities provides ease of access to on-site utilities, and increased distance to future launch sites resulting in added safety. There is also land available for apron expansion and the location will serve the planned HLHR runways.



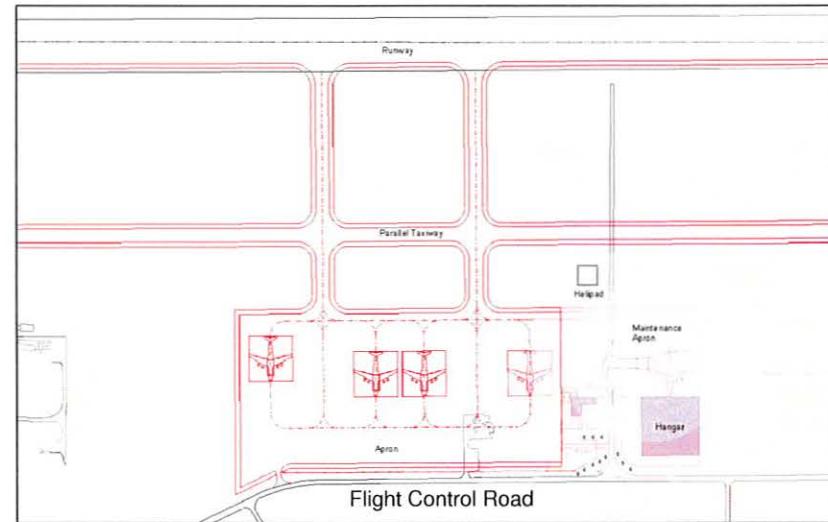
Skid Strip and Cape Canaveral Air & Space Complex

The Cape Canaveral Air & Space Complex allows for full access to Phillips Parkway and Pier Road. All necessary utilities are already on site, including water, power, sewage and communications. No Installation Restoration Program (IRP) sites or Solid Waste Management Unit's (SWMU) are located in the proposed development area and no historic or cultural sites are in the vicinity. The Cape Canaveral Air & Space Complex offers the best location for the ATCT (midfield), and on the south side of the runway. Also, this site, south of the runway, places the inhabited facilities further away from all future planned launch activity. The Cape Canaveral Air & Space Complex also provides a large area for future apron expansion. If the mission changes, and a future HLHR runway is constructed, the Cape Canaveral Air & Space Complex places the ATCT and facilities midfield on either of the HLHR runways.

Apron

The proposed Cape Canaveral Air & Space Complex apron is designed to accommodate four C-5/Antanov sized aircraft with all proper wingtip clearances maintained. Existing operational

capacity will be maintained while allowing for some operational expansion. The new apron is specially designed for ease of unloading large cargo aircraft like the C-5 or the Antonov. The western most parking spot has more than double the length of a C-5's interior cargo space, allowing for payloads and rocket segments to be off-loaded without closing the remainder of the ramp or the adjacent taxiway, as is the current practice. The proposed Cape Canaveral Air & Space Complex will also increase safety by eliminating unloading operations inside of the primary surface.



Cape Canaveral Air & Space Complex Apron

Distinguished visitors and employees alike will benefit from the planned landscaping and entrance features. Functional force protection requirements have been combined with landscape beautification to create a sense of place while ensuring the safety of facility occupants. Adjacent to the building, anti-ram barriers are integrated into the landscaping design in the form of planters. Stand-off distances are used in combination with trees to give a park like setting while earthen berms are attractively landscaped to act as visual and physical barriers to hostile intentions.

Flight Control Road will become the gateway to Cape Canaveral Air & Space Complex. Drawing on the natural beauty of the Florida

environment, the land adjacent to Flight Control Road will be integrated with Scrub Jay Habitat. The above ground power lines will be buried in an earlier project that will allow varying width payloads to pass through the western apron gate for processing. Streetscape beautification will be included in the apron project and include the removal of exotic plant species along Flight Control Road, which will be replaced with native plants and Scrub Jay Habitat.

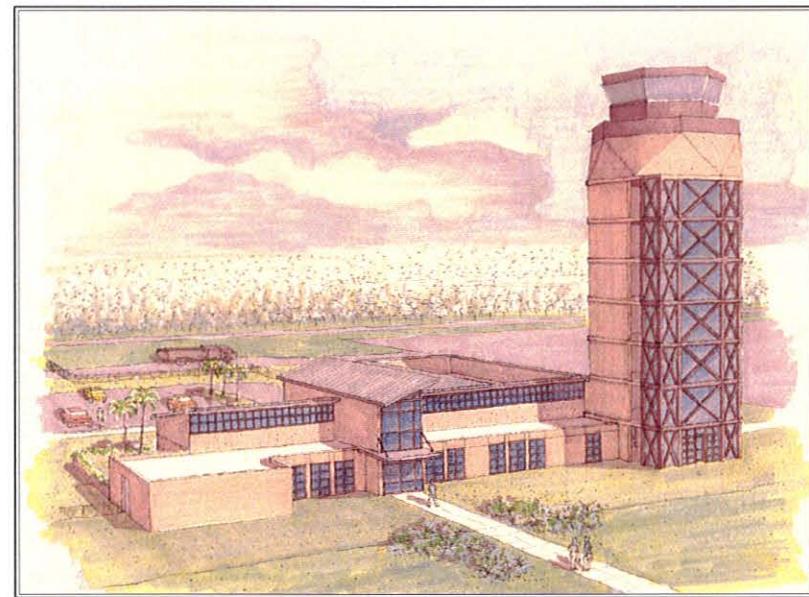


Cape Canaveral Air & Space Complex Sign

The construction of the Cape Canaveral Air & Space Complex apron will enhance CCAFS' image as a world-class spaceport and satisfy objectives 1.4 and 3.2, at the same time enhancing compliance with the 45th SW Facilities Excellence Plan and providing a morale-enhancing work environment. Providing the Cape Canaveral Air & Space Complex with a visual identity through streetscape design and a distinct architectural character will assert CCAFS' unique role in the mission of the 45th Space Wing and project a positive and productive image to potential customers and distinguished visitors.

ATCT

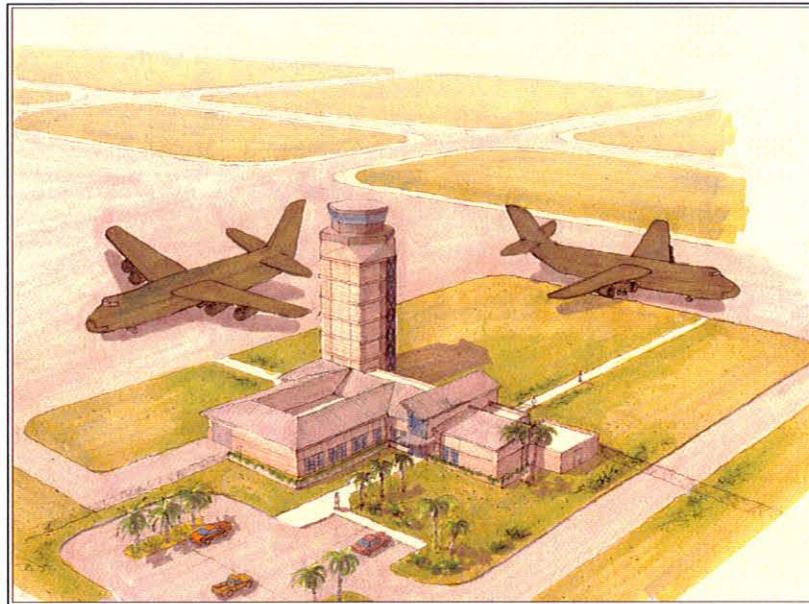
Safety will be enhanced through the construction of a new ATCT. Constructing a new ATCT at the location proposed by the Cape Canaveral Air & Space Complex will enhance safety three ways. First, locating the ATCT midfield gives the controller the best view of both ends of the runway and is recommended by the standards. Second, elevating the tower to the recommended height of 65 feet or taller will increase the controller's ability to recognize anomalies and make necessary corrections. Third, relocating the tower outside of the primary and transitional surfaces reduces the risk of an accident when an aircraft arrives or departs the runway.



Cape Canaveral Air & Space Complex, ATCT and AM Ops

The Air Traffic Control Tower or ATCT, collocated with the AM Ops Building, at the midfield location, is required to be at least 65 feet tall and consist of a minimum of five stories. UFC 3-260-01 and AFH 32-1084 Facility Requirements, "Paragraph 5.9.1.2.3: The Air Traffic Control Tower, category code 141-962, may be in the same building (as AM Operations). This is highly desirable for economy of effort and improved communication".

The proposed ATCT is designed for multiple controllers, is at the proper location and has room for all required ATCT equipment and instruments. The ATCT's ability to support multiple controllers allows for expanded operations and for increased capacity (O 1.2, O 1.3).



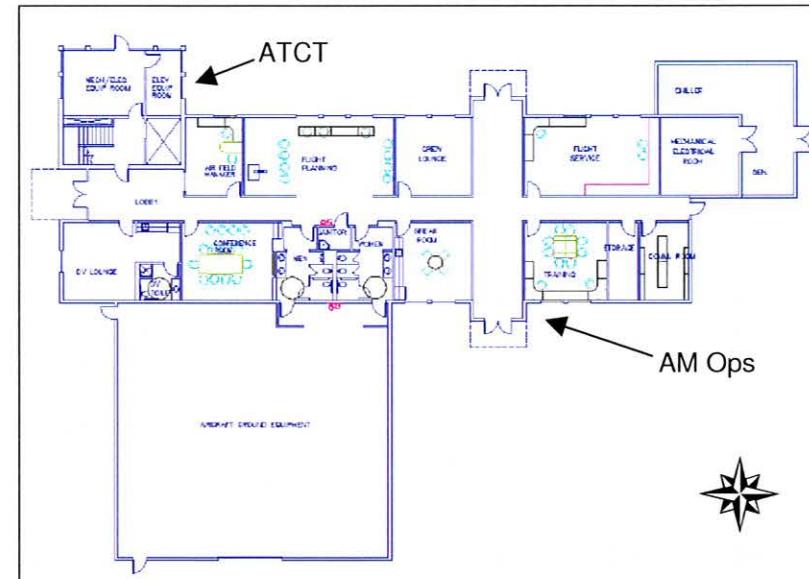
Cape Canaveral Air & Space Complex, AM Ops & ATCT

AM Operations Building

The AM Ops facility at the proposed Cape Canaveral Air & Space Complex has been designed to accommodate all of the requirements of the existing mission, and to allow for expansion. The following line drawing lays out one possible interior for the new facility. Adequate office space is available in the new tower for an Air Traffic Controllers office, or in the AM Operations facility proper. An aircrew lounge is available adjacent to the break room. Conference and training facilities are included as well as a new DV lounge and a private DV restroom.

The large bay on the south side of the facility is intended to store Aircraft Ground Equipment (AGE). Currently the AGE is stored out

in the open adjacent to Ops Flight Planning parking lot. The new facility will allow all the AGE to be stored out of sight in a controlled environment, which will extend equipment life. Later as the mission expands, the AGE bay can be converted into offices, and the AGE can be relocated. The proposed Cape Canaveral Air & Space Complex AM Ops Facility will fulfill all requirements of the existing mission, provide for DV comfort, increase capacity as needed and can be expanded to meet all future needs.



CCA&S Complex - AM Ops Building Interior

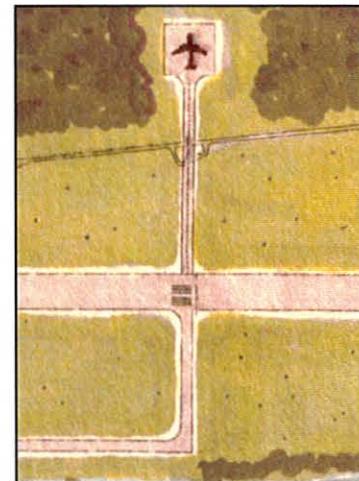
The proposed AM Ops Building and attached ATCT, exemplifies the historical spirit and creativity of the Cape while looking forward. The new AM Ops building and ATCT will be an attractive focal point for all operations on the Cape Canaveral Air & Space Complex, while expanded Distinguished Visitor facilities will welcome DVs into a comfortable environment and ensure that their first impression of CCAFS is favorable.

Parallel Taxiway

According to FAA regulations, only one heavy aircraft can be on the runway at a time. (FAA 7110.65P) Therefore, when one aircraft comes in, another one cannot leave until the first one has exited the runway. The Cape Canaveral Air & Space Complex will alleviate this problem and increase operational capacity by creating a parallel taxiway south of the existing runway. The parallel taxiway will allow for simultaneous operations, and decrease runway wear by shifting traffic from the runway to the taxiway. The taxiway will also reduce the risk of asphalt shoving created when planes turn around (180 degrees) on the runway to backtaxi to the apron. The parallel taxiway will assist in the optimal accomplishment of the launch mission (O 1.1), will improve infrastructure to support mission growth (O 1.2), and will well serve future launch customers (O 1.3).

Hazardous Cargo Pad

A Hazardous Cargo Pad is proposed in the Cape Canaveral Air & Space Complex. This pad will allow vehicles loaded with explosive commodities to complete operations without closing the runway and without exposing facilities or personnel to explosive hazards. This pad may even help reduce the size of any Quantity Distance (QD) Arcs if berms or blast barriers are erected when it is constructed. Moving explosive payloads off of the apron or runway increases safety on the apron and enables full use of the apron for other cargo carriers while eliminating the exposure risk. This facility will enhance safe working conditions at the Skid Strip as well as improving infrastructure for mission growth and better serving future launch customers.



Maintenance Apron and Hangar

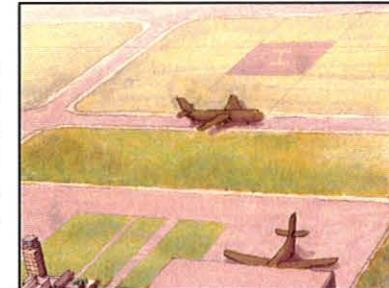
Positioning CCAFS to meet the future through the Cape Canaveral Air & Space Complex continues with the design of a Maintenance Apron and Hangar. Three potential needs are addressed with the construction of the hangar: first, classified payload unloading and storage, second, aircraft or spacecraft maintenance, and third, a covered area for loading space hardware onto horizontal vehicles (unfueled vehicles only, fueled vehicles would need to use the hazardous cargo pad). No specific design criteria or mission requirements have been established yet, but the maintenance apron, hangar and hazardous cargo pad have been included to reserve the space for future development.



Cape Canaveral Air & Space Complex, Hangar

Visual Flight Rules Helipad

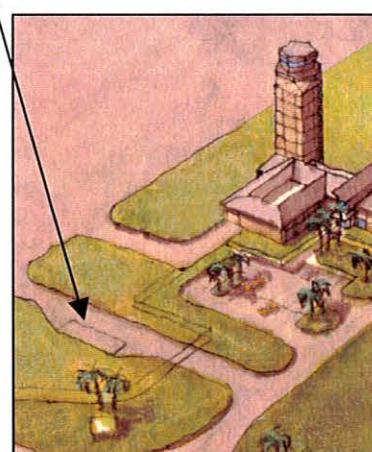
The Cape Canaveral Air & Space Complex will have a Visual Flight Rules (VFR) helipad built in conjunction with the apron. CCAFS currently does not have either a VFR or Instrument Flight Rules



(IFR) helipad. Existing VFR flight rules drive the design of a VFR helipad, but a GPS or ILS system will eventually be built at the Skid Strip. A GPS instrument approach will be designed and installed on the Skid Strip. When this happens the Cape Canaveral Air & Space Complex will be ready to accommodate an IFR helipad and approach.

Refueler Containment Area

The refueler containment area, built in conjunction with the apron, will decrease the environmental risk of spill contamination, satisfy the pollution prevention objective (O 2.1) and enhance safety on the roadways. Currently refueling trucks travel from PAFB and park at Fuel Storage Area 4. The refueler containment area will allow refuelers to be filled and parked on call for early or late flights, permitting refuelers to travel through Cocoa Beach during off-peak traffic hours, or at night, thus reducing the risk to the general public.



The Cape Canaveral Air & Space Complex is designed to better meet the needs of the existing mission while allowing for flexibility and an increase in mission capacity. The Cape Canaveral Air & Space Complex will enhance safety through the elimination of airfield waivers, while allowing for flexibility and growth of the existing mission.

5.3.2 Cons

Four primary constraints have been identified that require acknowledgement and acceptance by Air Force Management prior to construction of the Cape Canaveral Air & Space Complex, these are: the location of the Cape Canaveral Air & Space Complex inside of existing primary and secondary impact limit lines; surrounding Quantity Distance (QD) Arcs; potential Line of Sight (LOS) conflicts due to the height of the tower and proposed hangar;

and last, environmental constraints. Each of these risks may either be determined to be acceptable, or can be mitigated.

Impact Limit Lines (ILL)

The proposed Cape Canaveral Air & Space Complex, like the existing Skid Strip facilities, is located inside of the primary ILL for Launch Complexes 17, 36, 37 and 41, and inside secondary impact limit lines for Complexes 39A and B. This requires intermittent evacuation of these facilities for launches on Complexes 37 and 41. It is reasonable to expect that the Cape Canaveral Air & Space Complex will also require occasional evacuation for the Delta IV and Atlas V vehicles until launch vehicle stability is assured. Relocation of the Skid Strip runway and airfield complex out of the Impact Limit Lines is impossible as it would require relocation of the runway and there is no location suitably large enough outside of the ILLs.

QD Arcs

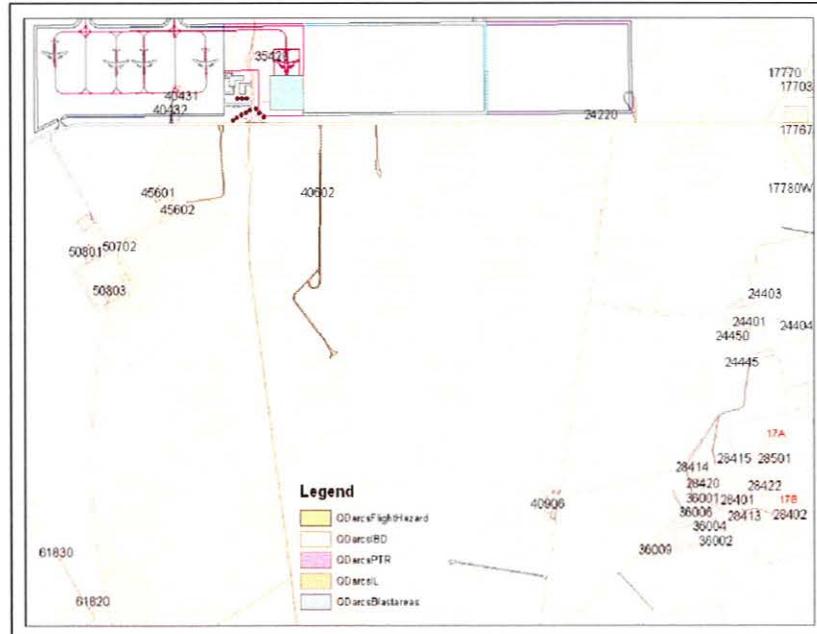
The Cape Canaveral Air & Space Complex is located in close proximity to four facilities with Quantity Distance (QD) Arcs; Complex 17B, the Delta Solid Rocket Motor Storage Facility, the Titan Get-Away-Special Facilities, and the Pegasus/Trident Vehicles. All of these arcs can be removed or will be relocated before construction starts on the Cape Canaveral Air & Space Complex.

The Flight Hazard Area (FHA) for Complex 17A (6,500 feet) will be deactivated by the Air Force in 2006 and turned over to NASA with the last scheduled NASA launch in 2008. NASA launches will continue on 17B through 2009. Therefore, since the Cape Canaveral Air & Space complex will not be built before 2010, the FHA for CX 17B may not impact any of the Cape Canaveral Air & Space Complex facilities (except the hangar).

The Titan Get-Away-Special facilities, which also have a QD Arc are vacant and abandoned. Project 06-1748 has been programmed in FY 2006 for the demolition of these facilities.

The third QD constraint is a combination of arcs generated by two vehicles, the Pegasus and the Trident. In the adjacent figure, unloading a Trident missile from an aircraft generates the largest

arc. This arc's terminal boundary is just east of the apron and AM Ops Building.

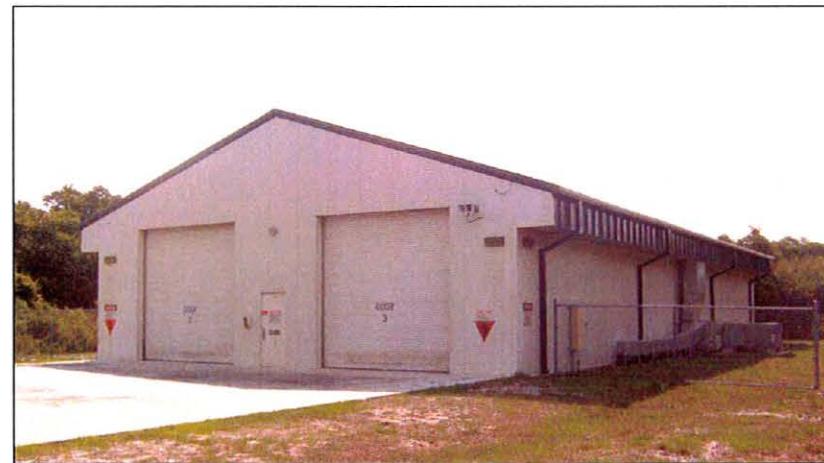


QD's and Flight Hazard Area from Complex 17

Future actions may mitigate the effects of these QD Arcs. First, the Pegasus vehicle has only one more flight scheduled from CCAFS, in 2006. After the 2006 flight there may be no more need to maintain the arc for the Pegasus. Second, Trident missiles typically do not unload at the Skid Strip and Air Force safety has indicated that this arc may not need to be maintained. However, a new QD arc may need to be drawn for a future next generation Trident missile. If that is the case then it is recommended that the new Trident QD Arc be sited at the east end of the Skid Strip or on the proposed Hazardous Cargo Pad.

The Delta Solid Rocket Motor (SRM) Storage Facility (35420), is located midfield and to the east of the Cape Canaveral Air & Space Complex. It stores Delta rocket motors for vehicles launching from Complex 17A and B. Built in 1993, the facility is constructed out of

corrugated metal mounted on a concrete slab. The Cost Replacement Value (CRV) is [REDACTED]. The Delta SRM Storage Facility should be relocated, in proximity to other Delta program facilities, (shown in the map south of Flight Control Road) and the QD Arc removed, prior to the Air Force turn over of the Delta facilities to NASA. The cost to relocate this building would be relatively inexpensive, and would include labor for deconstruction and reconstruction, cost for pouring a new concrete foundation and utility hookups.



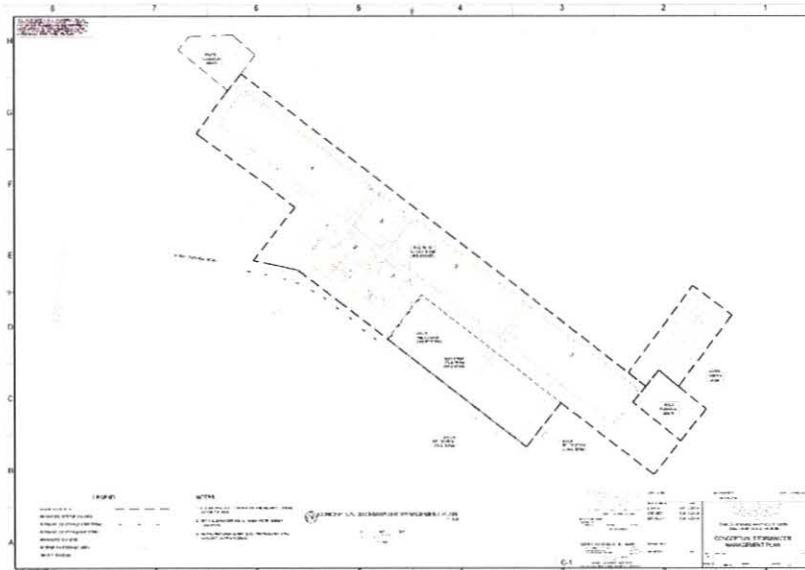
Delta Solid Rocket Motor Storage Facility

Line of Sight

A Line-of-Sight (LOS) impact has been identified for the optional Cape Canaveral Air & Space Complex Hangar. The optional hangar and proposed maintenance apron located to the east of the main apron, if built, could potentially block the LOS for Radar 1.16 to 17A. Since the hangar is proposed for the future, it is recommended that a new LOS analysis be conducted when the hangar option is exercised. At this time a 250 feet shift of the hangar to the east will eliminate the LOS blockage, but since Complex 17A program completion date is scheduled for between 2008 and 2011 (and since there is no program requirement for a hangar) this LOS may not need to be maintained, or an instrument solution may be available.

Environmental

Three environmental constraints have been identified: Scrub Jay Habitat Loss; an increase in impervious area; and re-channeling of an upland cut ditch. Construction of the apron, parallel taxiway and facilities proposed by the Cape Canaveral Air & Space Complex will result in the permanent loss of Scrub Jay Habitat estimated to be 60 acres. This includes an estimated 24 acres of dry stormwater retention area. Scrub Jay Habitat Loss restoration is charged at a rate of 4:1, or four acres of mitigation for each acre developed. Therefore, only the acres permanently removed from Scrub Jay Habitat would require compensation. Habitat mitigation normally entails burning to create scrub and takes place at a rate of 150 acres per year and costs an estimated [REDACTED] per acre.



Noble Engineering Ditch Rerouting and Stormwater Map

Construction of the Cape Canaveral Air & Space Complex will result in an increase in impervious area that will require an additional 24 acres of dry stormwater retention and a change in the SJRWMD Stormwater Management Permit. Noble Engineering was contracted to study the stormwater needs of the Cape

Canaveral Air & Space Complex. See fold out map in Appendix 2 for complete details.

In addition Noble Engineering also studied re-locating an upland cut ditch under the project footprint. The SJRWMD has agreed that the relocation of upland cut ditches does not constitute the taking of wetlands and does not require mitigation. Noble Engineering has developed a re-routing proposal for the upland cut ditches located around the Skid Strip and under the footprint of the Cape Canaveral Air & Space Complex. (See Appendix 2)



Facing East - An Upland Cut Ditch under the footprint of the CCA&SC. Flight Control Road is in the Right-hand Corner.

Constraint Summary

Four areas of potential constraint have been identified they are: Impact Limit Lines, QD Arcs, LOS, and Environmental. Each of these constraints were shown to be either an acceptable risk or able to be mitigated. The location of the existing Skid Strip apron inside of the ILL's for Complexes 17, 36, 37 and 41, and secondary impact limit lines for Complexes 39 A and B would suggest that new construction inside of ILL's is acceptable. Occasional

evacuation of the new airfield complex may be necessary, as it is now for the existing apron and facilities. All of the QD Arcs, except for those associated with the Delta SRM Storage Facility will either be eliminated by facility demolition or program completion. The SRM facility should be moved and rebuilt outside of the airfield area and sited to appropriately support the Delta program at CX 17. The potential impact to the LOS from Radar 1.16 to CX 17A from the optional Hangar will require a new LOS analysis, which will only be necessary if program requirements change. The last, and potentially most costly constraints are the environmental issues, specifically those caused by Scrub Jay Habitat Loss mitigation. Ditch rerouting and construction will commence with apron construction, or will be added to Project 04-1618 (or 04-1630) to be complete in the phasing cycle. An Environmental Assessment (EA) should begin as early as possible to expose the true cost and enable a mitigation strategy to be programmed and enacted.

6. Recommendation

Recommend Alternative 3 – Build the Cape Canaveral Air & Space Complex and complete all the SRMC programmed projects. Alternative 3 has phased solutions for short and long-term corrections to identified safety violations, allowing a reduction in airfield waivers, while at the same time providing objective measures for complying with established goals.

Goal 1 – Continual Improvement Toward Mission Excellence

Objective 1.1 – Site & develop facilities for optimal accomplishment of the launch mission

Objective 1.2 – Improve infrastructure to support mission growth

Objective 1.3 – Improve and modify facilities to best serve future launch customers

Objective 1.4 – Enhance compliance with the 45th SW Facilities Excellence Plan Architecture Guidelines

Goal 2 - Continual Improvement in Protection of the Natural and Human Environment

Objective 2.1 – Pursue all potential pollution prevention opportunities

Objective 2.2 – Minimize the destruction of endangered and/or threatened species habitats

Goal 3 – Continual Quality of Life Improvement

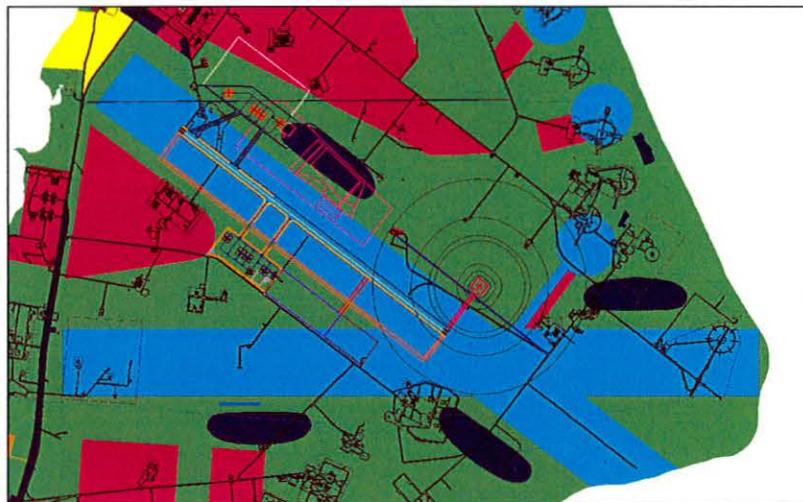
Objective 3.1 – Enhance Safe Working Conditions for the CCAFS Work Force

Objective 3.2 – Provide a morale-enhancing work environment for the work force

Alternative 3 satisfies all three goals taken for the CCAFS General Plan, while at the same time allowing growth toward the long-term vision provided by the CCSMP. The design of the Cape Canaveral Air & Space Complex was influenced by a view of the future first proposed in the CCSMP. Further research, current events and the President's desire to return to the Moon have validated that vision of the future. Shuttle replacement vehicles like NASA's Crew Expeditionary Vehicle (CEV), and the X-Prizes SpaceShipOne are driving the future of horizontal space launch and recovery. Long range planning suggests that long runways, a skilled workforce, existing infrastructure and a geographic separation from the surrounding population are all necessary for a successful launch service provider, and CCAFS has it all.

Long range planning, completed in the CCSMP, suggests that a Horizontal Launch Horizontal Recovery (HLHR) cross-runway may be built to the south of the existing Skid Strip within 75 years. The Cape Canaveral Air & Space Complex is well situated to accommodate any increase in runway length, or the proposed HLHR runway. By maximizing the space between the two runways, the Cape Canaveral Air & Space Complex serves both runways equally well while allowing Skid Strip lengthening, construction of the HLHR runway or both.

Therefore, Alternative 3 – Build the Cape Canaveral Air & Space Complex and complete all the SRMC programmed projects is the logical option.



Future Land Use Map from the CCSMP

7. Implementation of Alternative 3

Implementation of Alternative 3 must be done in a phased manner. The cost of correcting each airfield waiver in addition to the new construction and MILCON costs ensure that these projects cannot be done concurrently. (A complete discussion of the prioritization methodology can be found in Appendix 3).

Phased implementation of the projects should begin immediately with the removal of the trees inside of the Approach Departure Surface and Clear Zone Area to be graded. The removal of the obstructions (the tall trees) and the creation of Scrub Jay Habitat will begin the process of eliminating airfield waivers that will ultimately increase operations safety on the Cape Canaveral Air Force Station Skid Strip.

Once the trees on the runway ends are removed, the next proposed project is rerouting and placing culverts in the large drainage ditches in the clear zone and area of fragility. Completion of these projects will allow easy maintenance of the newly created Scrub Jay Habitat and reduce the risk associated

with short take-offs or long landings. These projects will provide a smooth and level grade for the entire length of the area of fragility, increasing safety for pilots and eliminating another airfield waiver. Next, demolish the abandoned Camera Pad on the approach end of Runway 31.

Completion of the above projects will create a new risk, flightline intrusions. To mitigate this risk, two projects are recommended concurrently; fence the newly open areas adjacent to roads and facilities and relocate the gates and bollards per the approved site plans.

The next four projects are designed to eliminate obstructions requiring an airfield waiver, and to increase safety by adding regulation lighting. In order of importance, these projects are: flush mount fire hydrants, install a rotating beacon, lower or relocate the Area Warning Lights and install MAAS cruciform foundations.

Ideally, once Scrub Jay Habitat is created through the removal of trees on the ends of the runway, the remaining habitat creating projects will be completed as funding becomes available. If possible priority projects 12 through 20 should be funded concurrently with projects 6 to 11. If not possible, the projects should be funded as they appear in the table. This will ensure that the approach end of runway 31, the most used runway end for landings and take-offs, will be clear of obstructions first. The remaining projects will slowly create Scrub Jay Habitat from east to west ultimately providing a habitat corridor stretching all of the way across the island.

Once the trees are removed, Controlled Area Signs, if still standing, will need to be removed and replaced in appropriate locations outside of the primary surface.

The last project to be completed in the Primary Surface/Lateral Clear Zone is correcting the grading. Improperly sloped surfaces surround the runway; two projects are proposed to correct these obstructions to the maximum extent possible. The first corrects grading from the edge of the paved shoulders out to 250 feet, and installs sod to reduce the risk of FOD. The next project grades from 250 feet out to 500 feet and spreads seed. Surface drainage

swales should be removed or made as gradual as possible and other above ground drainage considerations should be evaluated and corrected to avoid abrupt grade changes. Complete correction of the identified grading obstructions may not be possible due to the elevation of the runway and the contours of the land currently under the tree line. These projects, when completed, will also eliminate an airfield waiver.

Once all of the grading and tree removal projects have been completed, paved overruns and approach lights should be installed first on the east end and then on the west. This will increase safety by providing a paved surface for when pilots under or over-run the runway, and will also remove an airfield waiver.

The last three projects should only be completed if the MILCON is not funded or underway; first, add shoulders to the existing Skid Strip apron and increase taxiway shoulder width, second, relocate the ATCT radio pole and third, expand the Ops Flight Planning Building.

Within the MILCON projects, the Apron is recommended for construction first because of the high RAC codes and the three waivers the existing Skid Strip apron currently generates. The ATCT and AM Ops facilities should be built concurrently, and the last three should be built as the mission grows and changes.

8. Conclusion

Two critical items remain to be done; advocacy and follow through. None of the following projects will ever be completed without management support and advocacy before the Facilities Board. Continual support and promotion of the projects through the funding process must be a priority. Active support of the projects at the facilities board working groups and at the actual facilities board is critical for the projects to achieve funded status. Finally, follow through by reviewing new site plans for consistency with the goals and objectives of the ADP, the General Plan, and the CCSMP is necessary both by the site plan reviewing authority and by the ADP project sponsor. SGS Master Planning recommends that OSS and CE be tasked as the sponsor for these projects.

Annual review of the status of the ADP projects is recommended to ensure proper placement of the projects in the fiscal year budget. Also, annual review will assure projects are funded and completed in accordance with the schedule specified in this ADP.

The Skid Strip ADP has evaluated the existing facilities against the adopted goals of the General Plan and determined that they do not adequately support the existing mission, and that they cannot be expanded to support mission growth or be re-tasked for future missions. Therefore, thirty projects have been developed to correct on-airfield obstructions, reduce safety violation, and eliminate airfield waivers. These projects have been prioritized to correct the most egregious violations first in the most cost effective manner. This ADP has also evaluated a location for a future Cape Canaveral Air & Space Complex and created 6 MILCON projects for the completion of that complex.

Three alternatives have been offered as solutions to these problems, these are: maintain the status quo; complete only the SRMC programmed projects; or complete the SRMC programmed projects and construct the Cape Canaveral Air & Space Complex. The last alternative, Alternative 3, is recommended as it has phased solutions for short and long-term corrections to identified safety violations, which allow a reduction in airfield waivers, while at the same time providing objective measures for complying with established goals. Alternative 3 also encourages growth toward the long-term future vision provided by the CCSMP

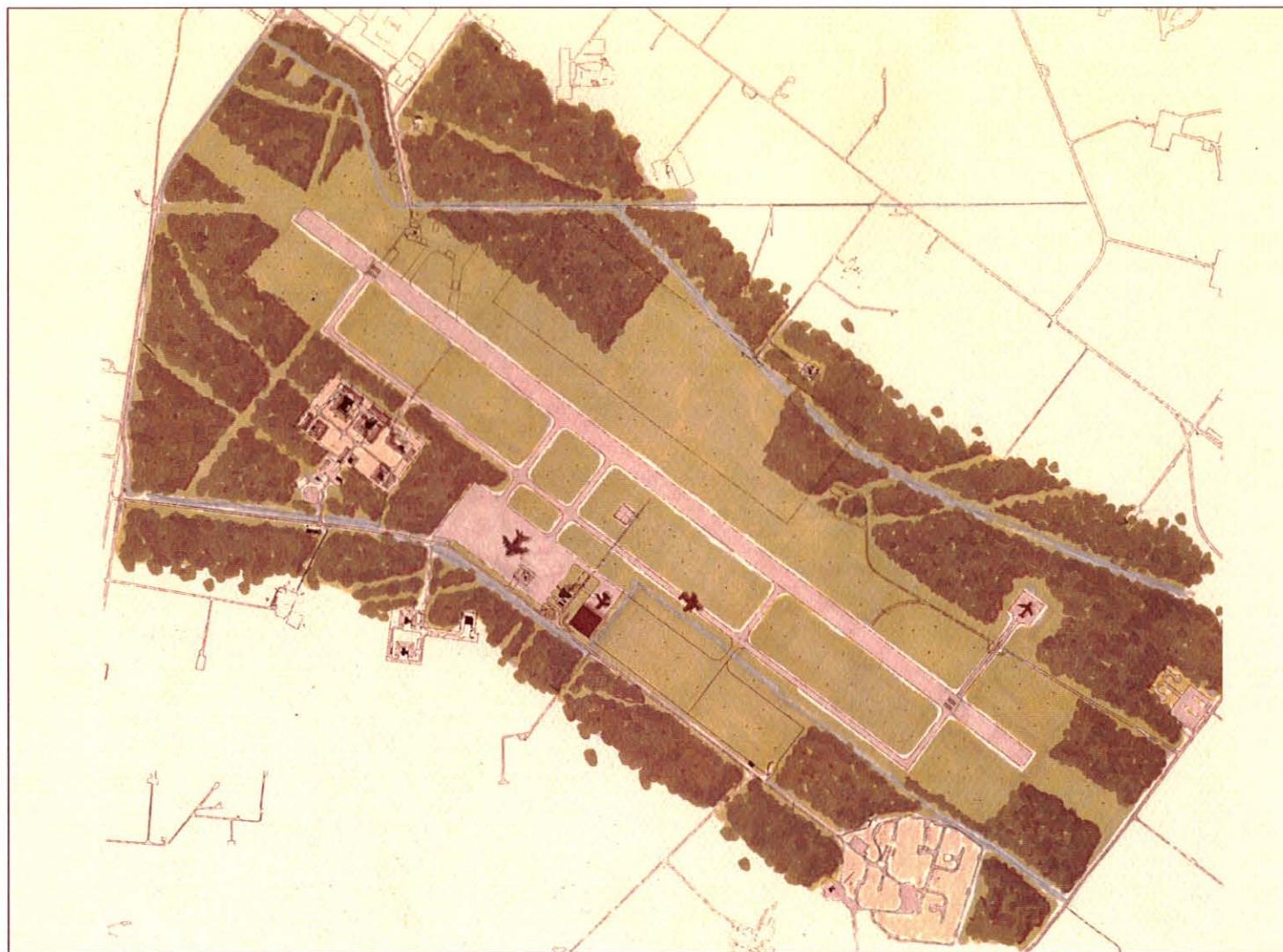
In conclusion the Skid Strip ADP develops a step-by-step method for reducing airfield waivers, increasing safety on the airfield and positioning CCAFS to capture increased market share by improving facilities to best serve future launch customers.

Table 1 - SRMC Programmed Projects

Priority	Name	(Acres)	Project Number	FY	Cost	ORM	RAC	CEI	APN Rank Order	RAC Number	Priority Area	AICUZ Data
1	Land Clearing, East Approach, RW 13/31 (127)	DBEH 00-1631	08			D2M	3 (I D)	2295	3(2295)	3	1	27.4
2	Land Clearing, West Approach RW 13/31 (128.5)	DBEH 03-1576	07			D2M	3 (I D)	2295	3(2295)	3	1	27.4
3	Ditch through Clear Zone – Reroute	DBEH 04-1618	09			E1M	3 (I D)	11904	3 (11904)	3	1	27.4
4	Ditch through Clear Zone – Culvert	DBEH 00-1630	08			E1M	3 (I D)	13650	3 (13650)	3	1	27.4
5	Fence the Skid Strip	DBEH 05-1518	09			NA	NA	NA	NA			
6	Gates and Bollards	DBEH 00-1629	08			D2M	3 (II C)	238	3 (238)	3	2	24.9
7	Demolish Camera Pad	DBEH 04-1582	09			D3L	3 (II C)	487	3 (487)	3	3	24.9
8	Fire Hydrants	WON 10088766				D2M	3 (II C)	631	3 (631)	3	2	24.9
9	Rotating Beacon	DBEH 01-1653	09			NA	3 (I D)	714	3 (714)	3	NA	NA
10	Area Warning Lights	DBEH 05-1519	09			E1M	3 (I D)	NA	NA	3	3	NA
11	Install Cruciform Foundations	WON 10155673				NA	NA	NA	NA			NA
12	Clear And Grub East End, RW13/31 (32)	DBEH 04-1640	09			NA	3 (I D)	637	3(637)	3	2	24.9
13	Clear And Grub Center, East RW13/31 (68)	DBEH 04-1641	10			NA	3 (I D)	1275	3(1275)	3	2	24.9
14	Clear And Grub Center, West RW 13/31 (64)	DBEH 04-1642	11			NA	3 (I D)	1173	3(1173)	3	2	24.9
15	Clear And Grub, West End, RW 13/31 (19)	DBEH 04-1643	12			NA	3 (I D)	357	3(357)	3	2	24.9
16	Clear Scrub Jay Area, SW, RW 13/31 (79)	DBEH 04-1646	15			NA	3 (I D)	1147	3(1147)	3	2	24.9
17	Clear Scrub Jay Area, SE, RW 13/31 (135)	DBEH 04-1647	16			NA	3 (I D)	2040	3(2040)	3	2	24.9
18	Clear Scrub Jay Area, NW RW 13/31 (124)	DBEH 04-1644	13			NA	3 (I D)	1785	3(1785)	3	2	24.9
19	Clear Scrub Jay Area, NE, RW 13/31 (159)	DBEH 04-1645	14			NA	3 (I D)	2295	3(2295)	3	2	24.9
20	Land Clearing, Various RW 13/31 (~40)	DBEH 04-1648	17			NA	3 (I D)	765	3(765)	3	2	24.9
21	Signs around the Airfield	DBEH 04-1591	09			D3L	4 (III C)	61	4 (61)	4	2	24.9
22	Grading grade to 250', sod 100'	DBEH 04-1652	09			D2M	3 (II C)	147541	3 (147541)	3	1	24.9
23	Grading grade from 250' to tree line seed	DBEH 04-1652	09			D2M	3 (II C)	54098	3 (54098)	3	1	24.9
24	Paved Overrun – East	DBEH 03-1590	09			D3L	4 (III C)	48611	4 (48611)	4	1	27.4
25	Approach Lights East End	DBEH 04-1619B	09			NA	NA	NC	NA		1	NA
26	Paved Overrun – West	DBEH 03-1591	09			D3L	4 (III C)	38888	4 (38888)	4	1	27.4
27	Approach Lights West End	DBEH 04-1619C	09			NA	NA	NC	NA		1	NA
28	Add shoulders Apron/Taxiway grade	DBEH 04-1620	09			D3L	4 (III C)	51388	4 (51388)	4	2	24.9
29	ATCT Radio Antenna and Pole	WON 10137208	09			E2L	4 (II D)	487	4 (487)	4	3	24.9
30	Expand Operations Flight Planning Facility	DBEH 04-1608	09			NA	NA	NA	NA	NA	NA	NA
TOTAL		(935.5)	30 Projects									

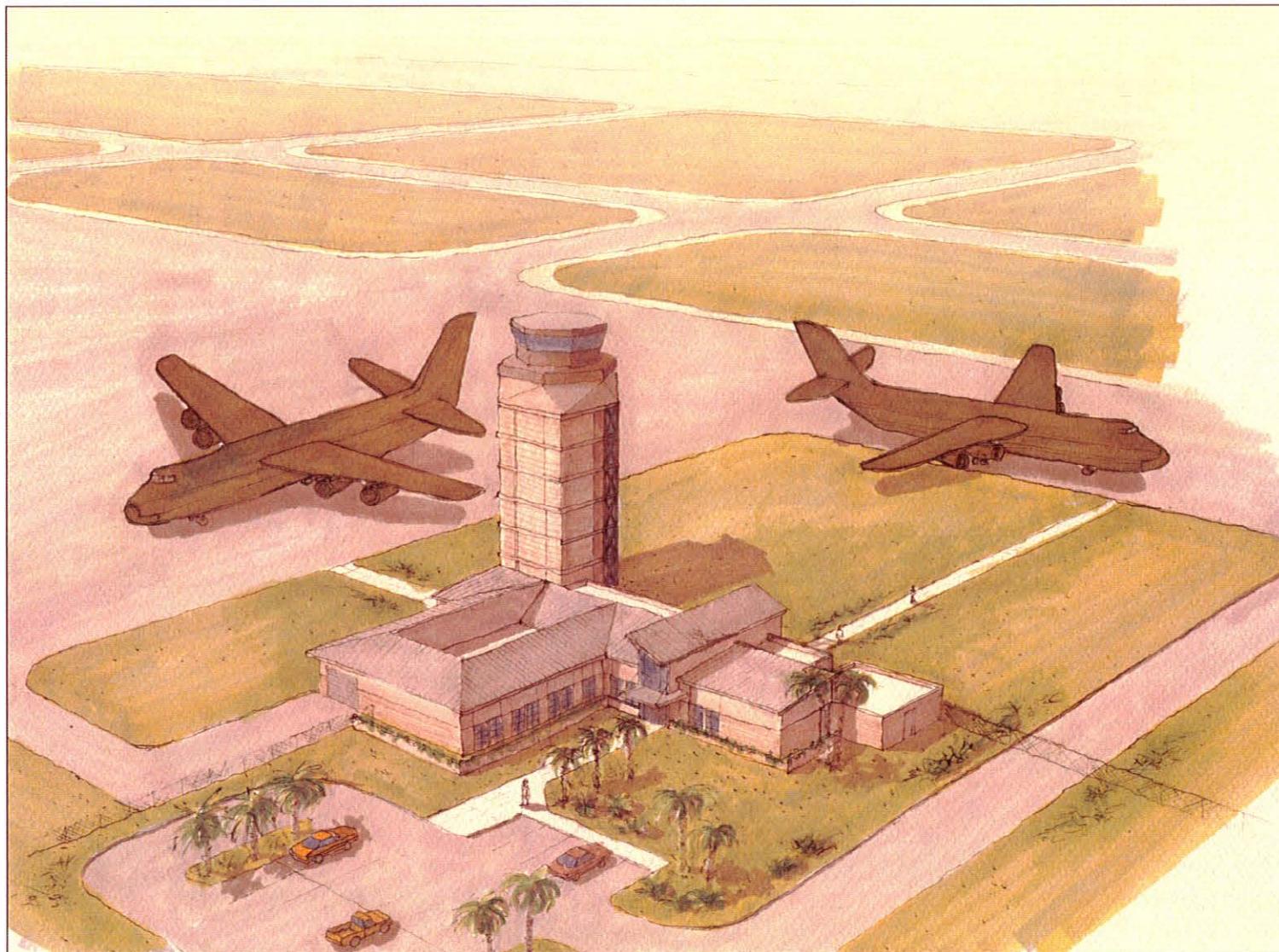
Table 2 – MILCON Projects

Priority	MILCONS	Project Number	
1	Apron	DBEH 05-3001	
2	Tower	DBEH 05-3002	
3	AM Ops Building	DBEH 05-3003	
4	Parallel Taxiway	DBEH 05-3004	
5	Hazardous Cargo Pad	DBEH 05-3005	
6	Hangar	DBEH 05-3006	
	TOTAL	6 Projects	



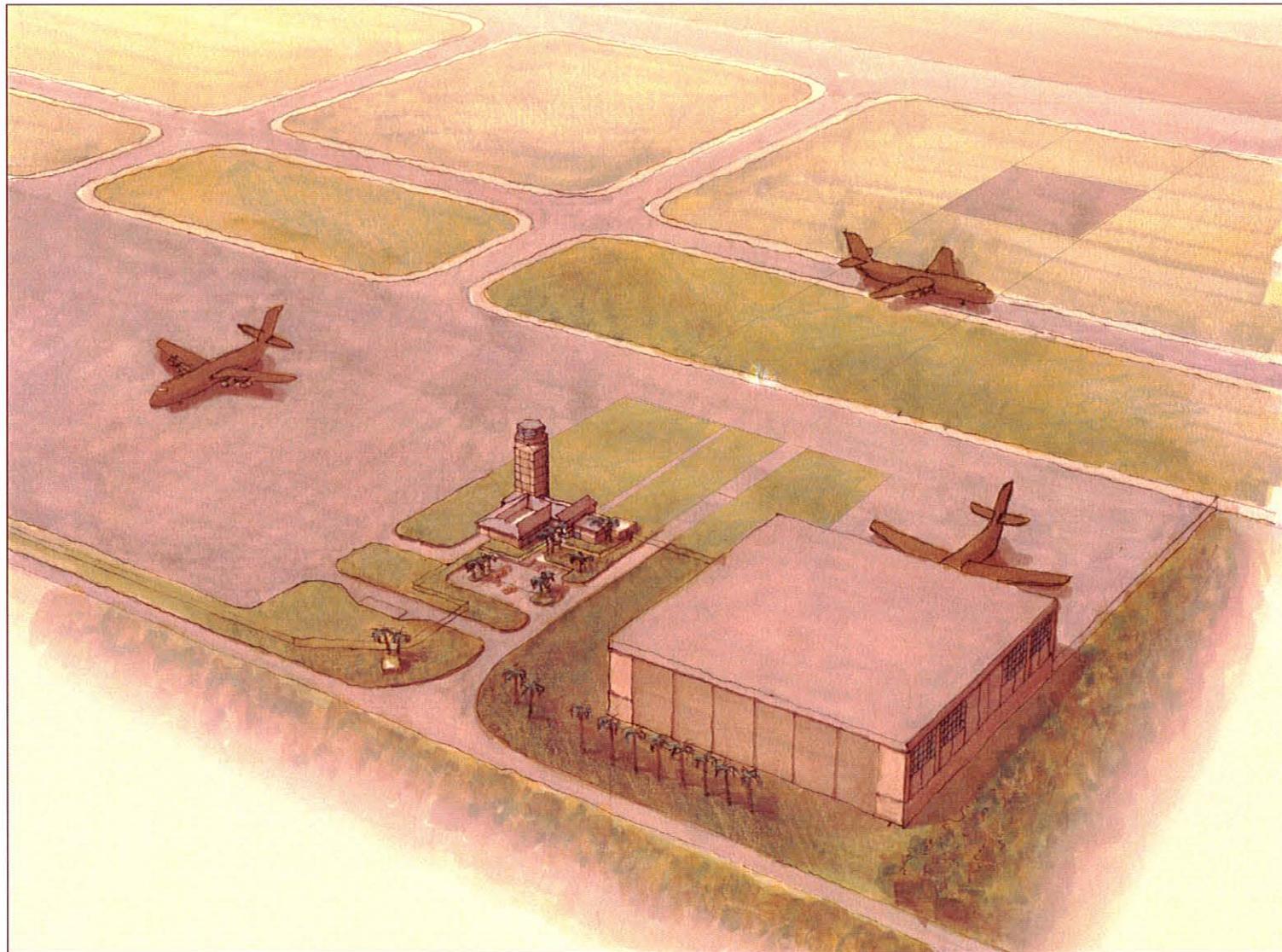
Cape Canaveral Air & Space Complex- Alternative 3 Complete

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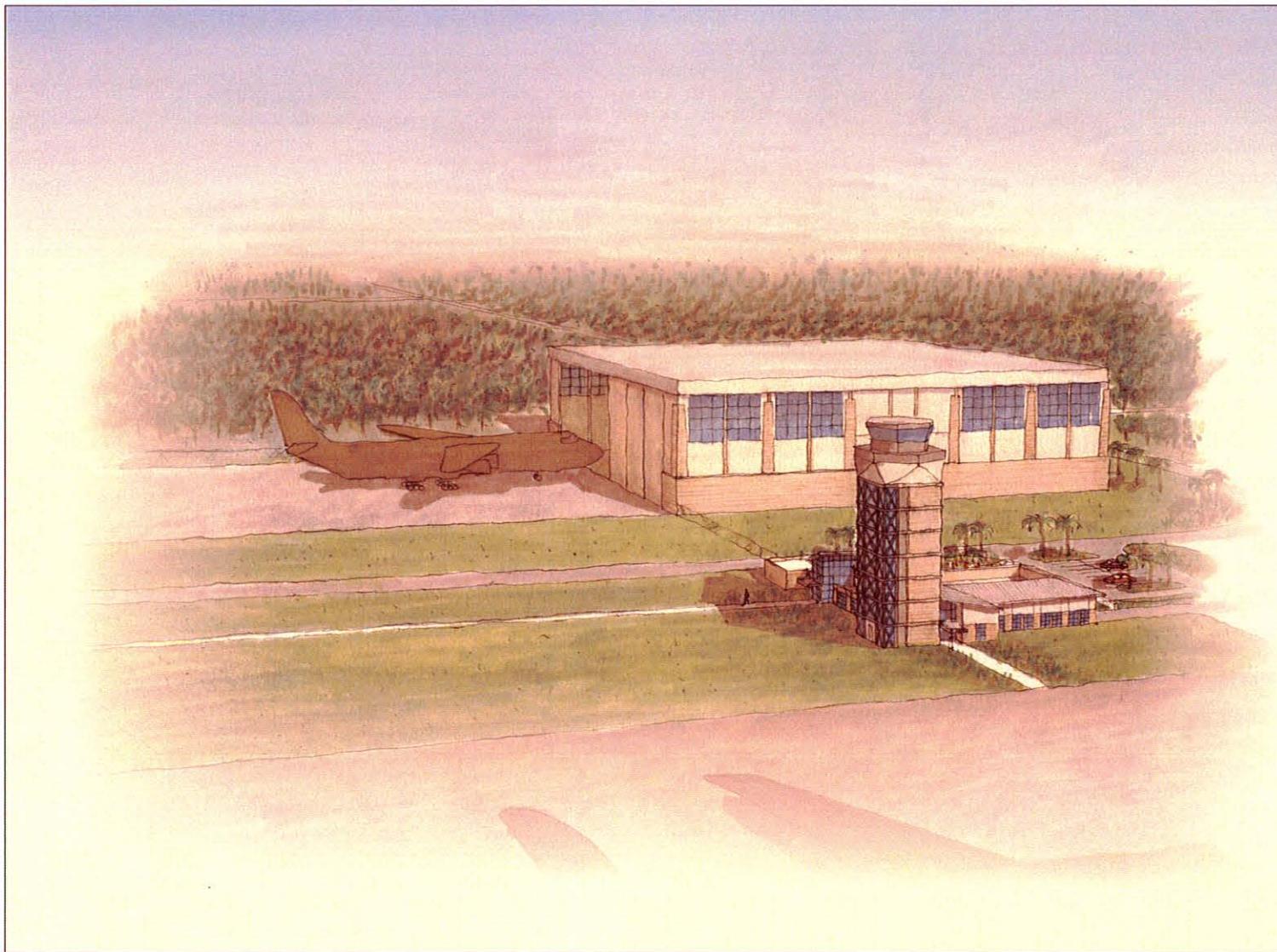
Cape Canaveral Air & Space Complex, ATCT and AM Ops Building

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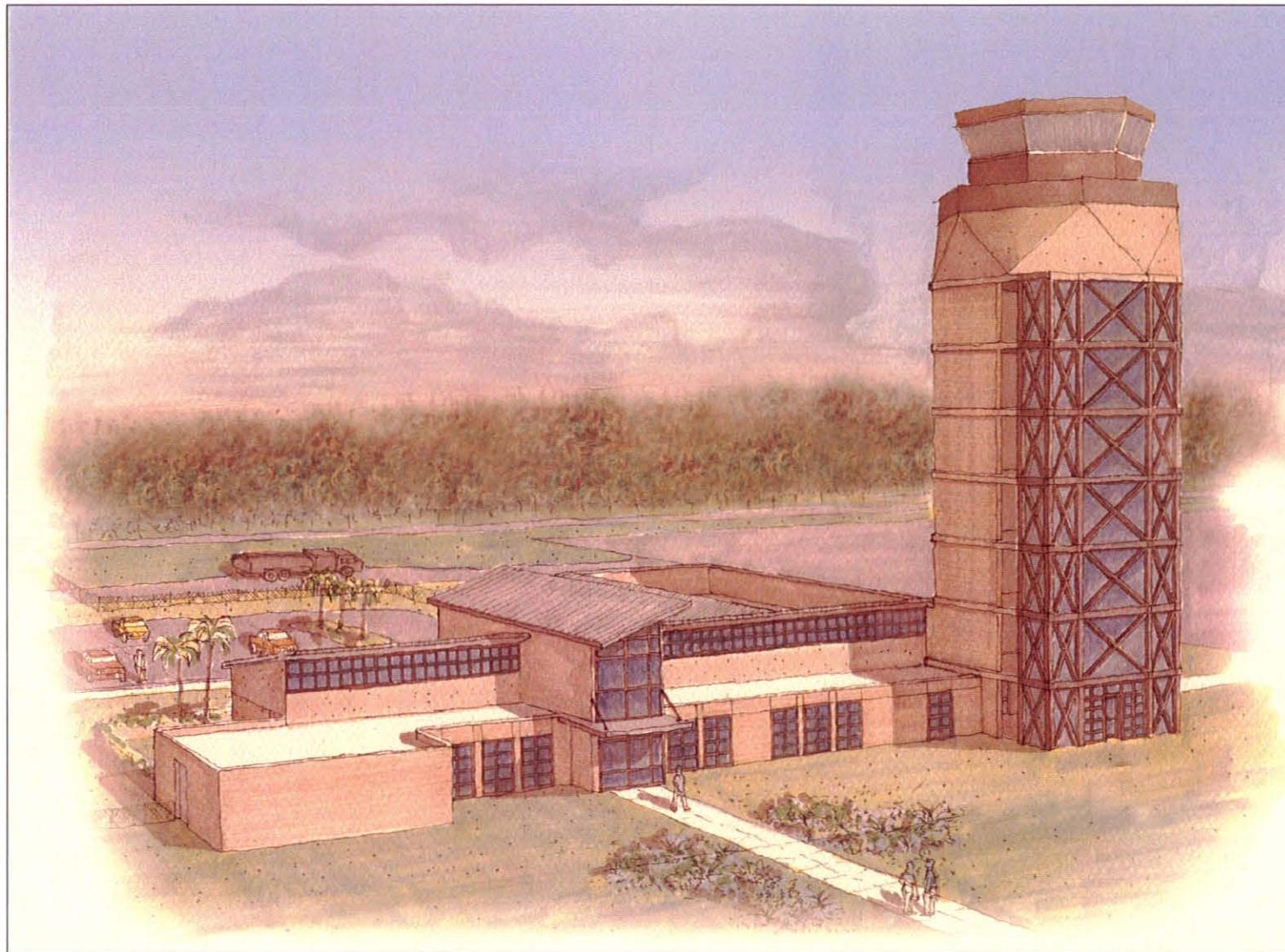
Cape Canaveral Air & Space Complex, Hangar, Helipad and Parallel Taxiway

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Cape Canaveral Air & Space Complex Hangar

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Cape Canaveral Air & Space Complex, ATCT & AM Ops Front Elevation

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PRELIMINARY
STORMWATER MANAGEMENT
CALCULATIONS
FOR
Skid Strip Area – South Option
Cape Canaveral Air Force Station, FL

August 22, 2004

By

By Space Gateway Support

In Association With

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INTRODUCTION

The following calculations are prepared for SGS Master Planning Office as part of a two-part task, evaluating future development conditions at the Cape Canaveral Air Force Station Skid Strip, as they relate to stormwater management. The scope of tasks is:

- Using the conceptual plan provide by SGS Master Planning Office, provide recommended re-routing of the drainage ditch for the Skid Strip Area Development Plan, South Option. The recommended location will be based upon review of the Unified Facilities Criteria (UFC), future development plan and existing drainage conditions.
- Prepare preliminary stormwater calculations to size a stormwater system in accordance with SJRWMD requirements. Prepare preliminary stormwater management plan to show new stormwater system, as well as accommodate diversion of off-site flows in relation to new stormwater management system.

DESCRIPTION OF EXISTING CONDITION

The existing skid strip is graded in a crown from the centerline, and it is considered the boundary between two drainage basins. The Skid Strip area located in the north basin drains to a parallel shallow swale that drains north along the east side of the existing Skid Strip apron and then drains west past the north end of the apron. The outfall ditch crosses Phillips Parkway south of the DRMO Facility with a 6' X 9' box culvert, before reaching the Banana River Lagoon. The south Skid Strip area drains to a parallel dry swale which cuts southwest in several locations to join the Flight Control Road drainage ditch. This ditch drains west along the north side of Flight Control Road, crossing Phillips Parkway with triple 48" culverts, before draining west to the Banana River Lagoon.

Brevard County soil survey, dated 1974, generally describes soils in this vicinity as Palm Beach (Pb) and Canaveral (Ca) series. Palm Beach sands are nearly level and gently sloping excessively drained soils that consist mainly of mixed sand and shell fragments.

Canaveral series soils consist of nearly level and gently undulating, moderately well drained sandy soils mixed with shell fragments. Permeability for these types of soils is very rapid.

The SGS GIS database indicates that the vegetation areas surrounding the Skid Strip are generally described as Mixed Oak/Saw Palmetto and with occasional Disturbed Sites (Occasional Bare Soil). The ditch cuts through the area are described with adjacent ruderal community vegetation.

Existing topography was referenced from the Baker 1995 topography maps. These maps indicate that the elevations at the existing runway centerline range from approximately [REDACTED] feet NAVD. The adjacent scrub area elevations range from approximately [REDACTED] NAVD. Swale elevations adjacent to the runway are indicated at approximately [REDACTED] NAVD.

Although there are several small site stormwater permits, the basins generally drain to the Banana River Lagoon, classified an Outstanding Florida Water, without the benefit of stormwater treatment. Of the permitted stormwater systems, dry retention systems are the typical treatment system. The permit files provide some limited information about permeability rates and groundwater elevations. Based upon this data, a gross estimate of the seasonal high groundwater table for preliminary calculation purposes is 2.5 to 3.0 feet NAVD.

DESCRIPTION OF PROPOSED IMPROVEMENTS

The proposed improvements consist of taxiway, paved overrun, and apron construction. At this time, phasing of the improvements has not been determined, except to differentiate between "short-term" (less than 10 years) and "long-term" projects. The drainage requirements were also calculated separately for the paved over-run areas and the north apron (Hazardous Cargo Pad), in the case that these areas would require individual consideration of stormwater management requirements.

Stormwater system improvements consist of dry retention storage areas to intercept basin runoff prior to discharge to the outfall ditch. The dry retention storage areas can be considered in the low areas

between and adjacent to the taxiway, aprons and runway. These areas can be established simply by grading up the proposed aircraft use areas and re-grading the paved areas and unpaved shoulders to the adjacent low areas. Connection of these areas by culvert is generally recommended to "equalize" the available storage and provide a positive outfall for large storm events.

The proposed improvements are shown on the attached Conceptual Stormwater Management Plan. In order to approximate the proposed available volume, these retention areas were considered at a bottom elevation of 5 feet NAVD and a depth of 1 foot.

The proposed Skid Strip area improvements require the relocation or piping of the south basin ditch. This ditch is located approximately 1,200 feet south and parallel to the Skid Strip from the east end for approximately 6,000 linear feet, then cuts west toward Flight Control Road and runs along the north side of Flight Control Road until it crosses Phillips Parkway with the triple 48" culverts. Approximately 2,400 linear feet of ditch is impacted by the proposed apron construction. Due to the size of the ditch, relocation is preferred to piping for cost and pollution prevention factors. The Conceptual Stormwater Management Plan shows a short-term and long-term ditch relocation plan. The short-term relocation plan shows the relocation of the ditch along the east side of the apron construction, under Flight Control Road and along the south side of Flight Control Road, then back to the north side of Flight Control Road to reconnect to the existing ditch at the east end of the Satellite Processing Area. The long-term relocation route follows a similar path, along the east side of the proposed long-term Skid Strip development area, across Flight Control Road, and reconnecting with the existing ditch to cross Flight Control Road. Although the elimination of the Flight Control Roadway crossings would be preferable from a hydraulic viewpoint, the north side of Flight Control Road is planned for utilization by the apron contraction.

DESIGN CRITERIA

The preliminary stormwater management design is subject to considerations of SJRWMD criteria for stormwater systems and grading requirements for areas adjacent to the runway. SJRWMD criteria are referenced from Chapter 40C-42, F.A.C. Class B runway

requirements are referenced from Unified Facilities Criteria (UFC) Airfield and Heliport Planning and Design (UFC 3-260-01, dated 1 November 2001).

Generally, the retention areas were approximated in area by assuming that the edge of pavement of the taxiway/runway shoulder was approximately [REDACTED]. A drop of 1.5 inches, a 5% slope for the first 10 feet, and then a 2% grade defined the estimated elevation change from edge of shoulder pavement. Using these slopes and elevations, the 5, 6, and 7-foot NAVD contours were drawn. Retention was estimated only from elevation 5 to 6 to allow differences in edge of pavement grades. Additionally, the retention areas depths and slopes may be adjusted at final design to allow for additional borrow generation and/or volume requirements.

In accordance with UFC requirements, above ground drainage structures, including headwalls, are not permitted within 375 feet of the runway centerline. This criterion is considered when connecting the stormwater storage areas by placement of culverts toward the Flight Control Road side of the storage areas.

With respect to the ditch relocation, the relocation plan will be subject to permit by St. Johns River Water Management District (SJRWMD) 40C-40 Environmental Resource Permit criteria. Although current regulations do not require mitigation of the surface water impact to an upland cut ditch, regulations would consider impact with respect to water quality opportunities for pollution prevention. The relocation of the ditch with an equivalent or longer length of ditch would provide the same or greater opportunity for pollutant removal by mixing, dilution, filtering and nutrient uptake capabilities.

LIMITATIONS

The final grading of the retention areas will be subject to a current topographic survey of existing conditions and geotechnical investigation to verify wet season water table elevations.

The stormwater management areas were analyzed only for water quality volumes. Due to the complexity of the water quantity analysis, this criterion was not modeled as part of this preliminary investigation. It should be noted that water quantity volumes would

significantly increase the stormwater storage requirements in the proposed retention areas. However, due to the relatively large retention areas and volumes available, it is assumed that the water quantity volumes can readily be provided in the defined areas.

SITE DATA

Paved Overrun Area	
Site Acreage (800' x 1,200')	22.0 acres
Drainage Basin Area	22.0 acres
Existing Impervious Area	0
Proposed Impervious Area: (300' x 1,000')	6.9 acres
Total Impervious	6.9 acres (31.4%)

Skid Strip Area Basin (Long Term)	
Site Acreage	491.3 acres
Drainage Basin Area	491.3 acres
Existing Impervious Area	30 acres
Proposed Impervious Area:	170 acres
Total Impervious	200 acres (40.7%)

Skid Strip Area Basin (Short Term)	
Site Acreage	403.8 acres
Drainage Basin Area	403.8 acres
Existing Impervious Area	30 acres
Proposed Impervious Area:	96.6 acres
Total Impervious	126.6 acres (31.4%)

North Apron Basin (Hazardous Cargo Pad)	
Site Acreage	42.2 acres
Drainage Basin Area	42.2 acres
Existing Impervious Area	1.5 acres
Proposed Impervious Area:	8.2 acres
Total Impervious	9.7 acres (23.0%)

WATER QUALITY VOLUMEPaved Overrun Basins:

1" over the basin OR 0.5" over the basin plus 1.25" of runoff from the impervious area, whichever is greater:

1" over basin:

$$1" \times 22.0 \text{ acres} \times (1'/12") = 1.8 \text{ Ac-ft (0.9 ac-ft each side of centerline)}$$

OR

$$[(0.5" \times 22.0 \text{ acres}) + (1.25" \times 6.9)](1'/12") = 1.6 \text{ Ac- ft}$$

Skid Strip Area Basin (Short Term):

1" over the basin OR 0.5" over the basin plus 1.25" of runoff from the impervious area, whichever is greater:

1" over basin:

$$1" \times 403.8 \text{ acres} \times (1'/12") = 33.7 \text{ Ac-ft}$$

OR

$$[(0.5" \times 403.8 \text{ acres}) + (1.25" \times 126.6)](1'/12") = 30.0 \text{ Ac- ft}$$

Skid Strip Area Basin (Long Term):

1" over the basin OR 0.5" over the basin plus 1.25" of runoff from the impervious area, whichever is greater:

1" over basin:

$$1" \times 491.3 \text{ acres} \times (1'/12") = 40.9 \text{ Ac-ft}$$

OR

$$[(0.5" \times 491.3 \text{ acres}) + (1.25" \times 200)](1'/12") = 41.3 \text{ Ac- ft}$$

North Apron Basin (Hazardous Cargo Pad):

1" over the basin OR 0.5" over the basin plus 1.25" of runoff from the impervious area, whichever is greater:

1" over basin:

$$1" \times 42.2 \text{ acres} \times (1'/12") = 3.5 \text{ Ac-ft}$$

OR

$$[(0.5" \times 42.2 \text{ acres}) + (1.25" \times 9.7)](1'/12") = 2.8 \text{ Ac- Ft}$$

WATER QUANTITY VOLUME

Water quantity requirement is pre-/post-development peak rate attenuation for the 25 year-24 hour storm event. Since none of the drainage basins exceed 50% impervious area, the mean annual pre-/post-development peak rate attenuation is not applicable.

At this time, no pre-/post-development attenuation calculations are performed. Reference the report Limitations section for additional information.

RETENTION STAGE/STORAGE

Paved Overrun

1' Depth:

100 SF x 1,000 ft = 100,000 CF (2.3 acre-ft), where sideslope = 50:1 and bottom width = 50'

Retention Volume required = 0.92 ac-ft

$$\therefore \text{Overflow elevation} = \frac{(0.92 - 0)}{X} = \frac{(2.3 - 0)}{1.0}$$

X= 0.4, therefore, provide overflow at a depth of 0.4'

Skid Strip Area (Short-term)

Area 1

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (FT)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	2.4	5.7	7.4	7.4	0
6	12.4				7.4

Areas 2 and 3 (Each)

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (FT)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	1.9	2.8	1.0	2.8	0
6	3.6				2.8

Area 4

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (FT)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	45.3	5.7	49.6	49.6	0
6	53.8				49.6

Area 5

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (FT)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	8.0	9.4	1.0	9.4	0
6	10.8				9.4

Total Skid Strip Area (Short-term)

	El 5 (ft NAVD)	El 6 (ft NAVD)
Area1	0	7.4
Area2	0	2.8
Area3	0	2.8
Area4	0	49.6
Area5	0	9.4
Total	0	72.0

Retention Volume required = 0.92 ac-ft

$$\therefore \text{Overflow elevation} = \frac{(0.92 - 0)}{X} = \frac{(2.3 - 0)}{1.0}$$

X = 0.40, therefore, provide overflow at a depth of 0.4'

Skid Strip Area (Long-term)

Area 1

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	2.4	5.7	7.4	7.4	0
6	12.4				7.4

Area 2

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	1.9	2.8	1.0	2.8	0
6	3.6				2.8

Area 3

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	9.2	20.2	1.0	20.2	0
6	15.6				20.2

Area 4

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	45.3	5.7	49.6	49.6	0
6	53.8				49.6

Area 5

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	8.0	9.4	1.0	9.4	0
6	10.8				9.4

Area 6

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	39.0	42.8	1.0	42.8	0
6	46.6				42.8

Area 7

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	38.2	42.0	1.0	42.0	0
6	45.7				42.0

Total Skid Strip Area (Short-term)

	El 5 (ft NAVD)	
Area1	0	7.4
Area2	0	2.8
Area3	0	20.2
Area4	0	49.6
Area5	0	9.4
Area6	0	42.8
Area7	0	42.0
Total	0	174.2

Retention Volume required = 41.3 ac-ft

$$\therefore \text{Overflow elevation} = \frac{(41.3 - 0)}{X} = \frac{(174.2 - 0)}{1.0}$$

X= 0.24, therefore, provide overflow at a depth of 0.25'

North Apron – (Hazardous Cargo Pad)

Elev (ft NAVD)	Storage Area (Ac)	Ave Area (Ac)	Depth (ft)	Inc. Volume (Ac-ft)	Cum Volume (Ac-ft)
5	0.9	5.7	1.0	5.7	0
6	10.6				5.7

Retention Volume required = 3.5 ac-ft

$$\therefore \text{Overflow elevation} = \frac{(3.5 - 0)}{X} = \frac{(5.7 - 0)}{1.0}$$

X= 0.6, therefore, provide overflow at min el 5.6 ft

Four methods have been explored to determine the order in which the projects should be completed. These methods are: Cost Effectiveness Index (CEI), Risk Assessment Code (RAC), Operational Risk Management (ORM), and Priority Area. Individually, they prioritize each project differently. Each method is combined together and evaluated, in conjunction with practical reasoning, to weigh obstructions that expose pilots and crews to the most risk. Those ranked highest should be completed first.

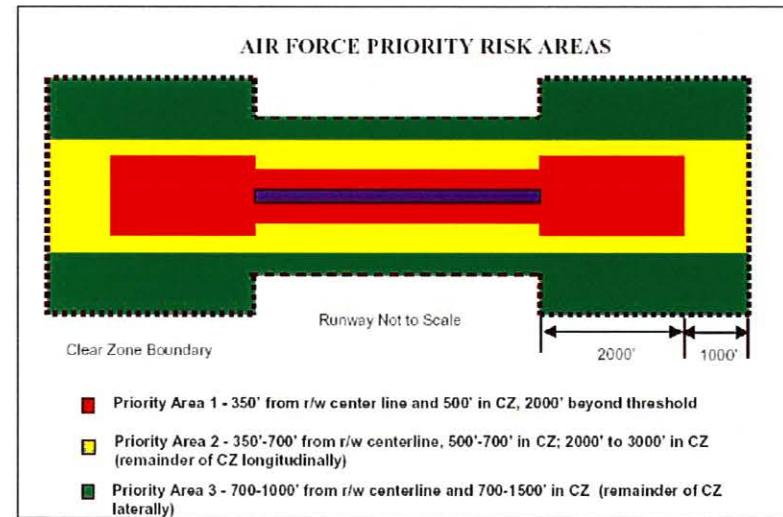
The first criteria used is the RAC, or risk assessment code. This is a number assigned to an obstruction that represents both the probability of an accident and the severity of the damage caused by the obstruction. RACs are first assigned a severity of I to IV, with I being death or over \$1 million in damages. Then the probability of an accident occurring is given a letter A to D, with A being "Likely" and D being "Unlikely." Matrixed together they are given a number 1 to 5, with 1 being "Imminent Danger" and 5 being "Negligible." So a RAC of 3 (I D) means that there is a (3) Moderate Danger that a (I) "Death or damage greater than \$1M", but as a (D) it is unlikely to occur. At the Skid Strip, all of the trees surrounding the runway have been assigned a RAC or 3 (I D). Based on the RAC a Cost Effectiveness Index has been calculated to evaluate the cost of a project to fix the obstruction in relation to the yearly risk associated with the obstruction. Like the RACs, Air Force Ground or Flight Safety assigns the CEI. At the Skid Strip, Ground and Flight Safety worked together to assign CEIs. Using a combination of the RAC and CEI, a risk abatement priority number or APN is generated to determine which project should be completed first. The APN takes the numeral from the RAC and joins it to the CEI or 3 (487). Therefore projects with a higher RAC number and a lower CEI should be completed first. At the Skid Strip, the gates and bollards on Control Tower Road have a RAC or 3 and a CEI of (238), while the camera pad at the east end of the runway has a RAC of 3 and a CEI of (487). Therefore the moving the Gate should be done before demolishing the Camera Pad.

The second priority considered is the ORM or Operational Risk Management score. The ORM is assigned for all objects needing an airfield waiver. The ORM process evaluates the risk of an object and then assigns controls to reduce or mitigate the risk. While the ORM

score was considered, it is not relied on heavily for the project prioritization.

The third consideration is the AORI Priority Area. The AORI is the Airfield Obstruction Reduction Initiative. The Priority Areas ring the airfield in widening areas and are used by MAJCOM to fund the most critical obstructions for correction first. The Priority Areas are shown below. Because of their proximity to the runway, obstructions inside of priority area one are recommended for correction first.

The last consideration is cost. Items with a small price tag that are relatively easy to fix are ranked before those that are very expensive. Projects are presented in the following table in the order in which they should be completed, but fiscal or calendar years are not displayed. The recommended order must be maintained, as the start of some projects is dependent upon the completion of others. Air Force Civil Engineering and Air Force Airfield Management has reviewed the rank order of these projects, and they concur. Project scope and justification have been completed and evaluated through the Facility Board Process.



Priority Areas from the Airfield Obstruction Reduction Initiative

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Appendix D

SHPO Letter



FLORIDA DEPARTMENT OF STATE

Kurt S. Browning

Secretary of State

DIVISION OF HISTORICAL RESOURCES

Mr. E. Alexander Stokes III
Department of the Air Force
45 CES/CEVP
1224 Jupiter Street, MS-9125
Patrick Air Force Base, Florida 32925-3343

April 9, 2009

RE: DHR Project File Number: 2009-1902
Skid Strip Vegetation Management Plan
Cape Canaveral Air Force Station, Brevard County

Dear Mr. Stokes:

Our office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*. The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR Part 800: Protection of Historic Properties* and the implementing state regulations.

We note that portions of this project will take place within two high areas of archaeological potential (AAP) while the remainder will take place in low AAP. Ground disturbing activities in these areas could have an adversely affect on archaeological sites. Therefore, this office concurs with your conditions of archaeological monitoring, reconnaissance level survey in low AAP area, and a Phase I survey in high AAP areas. A copy of the resultant monitoring and survey reports must be forwarded to this office after completion of the investigations.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail sedwards@dos.state.fl.us, or at 850-245-6333 or 800-847-7278.

Sincerely,

A handwritten signature in black ink that reads "Frederick P. Gaske".

Frederick P. Gaske, Director, and
State Historic Preservation Officer

Appendix E

Florida State Clearinghouse Letter



Florida Department of Environmental Protection

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

July 6, 2009

Ms. Angy L. Chambers
Department of the Air Force
45 CES/CEAN
1224 Jupiter Street, M.S. 9125
Patrick AFB, FL 32925-3343

RE: Department of the Air Force - Draft Final Environmental Assessment for the Skid Strip Area Development Plan at Cape Canaveral Air Force Station - Brevard County, Florida.
SAI # FL200905224761C

Dear Ms. Chambers:

The Florida State Clearinghouse has coordinated a review of the subject Draft Final Environmental Assessment (EA) under the following authorities: Presidential Executive Order 12372; Section 403.061(40), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended.

The Florida Department of Environmental Protection's (DEP) Central District Office in Orlando advises that the development activities proposed for evaluation under the EA may be subject to the following regulatory program requirements:

- Industrial Wastewater, per Rule 62-621.300(2), *Florida Administrative Code (F.A.C.)*, for any discharges of produce groundwater, including discharges generated by flushing or pressure testing associated with pipe line, storage tanks, etc. Please contact Mr. Ali Kazi, Engineer, at the Central District Office at (407) 893-3316 for further information.
- Potable Water mains or water plant construction to serve the expanded area proposed in this advance notification may require permits from the water purveyor. Please contact Mr. Reggie Phillips, Environmental Manager, at (407) 893-3319.
- Air Resources Management staff notes that the demolition of the existing control tower and associated buildings requires asbestos surveys and notification to the DEP prior to the activity. Asbestos abatement is needed if the survey indicates that it meets the applicable National Standard of Hazardous Air Pollutants thresholds and requirements. If the concrete is removed, it should also be tested for asbestos and properly disposed. If it does contain asbestos, it cannot be crushed. Please contact Ms. Caroline Shine, Acting Program Administrator, at (407) 893-3336 for additional information and future coordination.

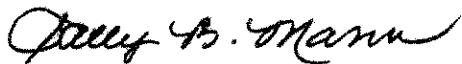
Ms. Angy L. Chambers
July 6, 2009
Page 2 of 2

The St. Johns River Water Management District (SJRWMD) notes that Cape Canaveral Air Force Station staff has begun coordination with SJRWMD staff on this project. Wetland and surface water impacts are expected to be limited to filling or piping of the upland cut ditches. These impacts to upland cut ditches typically do not require mitigation. The proposed improvements to the airfield are expected to require modifications to the surface water management system. It is expected that the project will exceed thresholds and will require an Environmental Resource Permit (ERP) from SJRWMD. During the permit application review process, the applicant must demonstrate that any direct and secondary impacts to wetlands, and adverse impacts to the wildlife value of wetlands and surface waters, have been avoided or minimized. Unavoidable impacts would require mitigation in accordance with the Unified Mitigation Assessment Method found in Chapter 62-345, F.A.C. Compliance with the environmental review criteria in Chapter 12 of the SJRWMD Applicant's Handbook would also be required. Please note all required ERP permits must be issued prior to any clearing or other construction activities within a project area. Please contact Ms. Susan Moor, Supervising Regulatory Scientist, in the Palm Bay Service Center by phone at (321) 676-6626, or by email at smoor@sjrwmd.com with any questions.

Based on the information contained in the Draft Final EA and enclosed state agency comments, the state has determined that, at this stage, the proposed federal activities are consistent with the Florida Coastal Management Program (FCMP). The concerns identified by our reviewing agencies must, however, be addressed prior to project implementation. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and any subsequent reviews. The state's final review of the project's consistency with the FCMP will be conducted during the environmental permitting stage.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,



Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lec
Enclosures

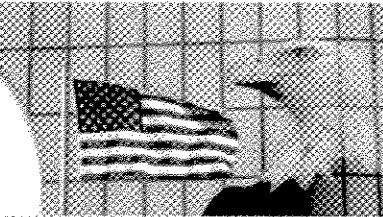
cc: Lisa Kelley, DEP, Central District
Steven Fitzgibbons, SJRWMD



Florida

Department of Environmental Protection

More Protection, Less Process



CATEGORIES

[DEP Home](#) | [OIR Home](#) | [Contact DEP](#) | [Search](#) | [DEP Site Map](#)

PROPOSED ACTION

Project	FL200905224761C
Comments Due	06/25/2009
Review Due	07/06/2009
Description	DEPARTMENT OF THE AIR FORCE - DRAFT FINAL ENVIRONMENTAL ASSESSMENT FOR THE SKID STRIP AREA DEVELOPMENT PLAN AT CAPE CANAVERAL AIR FORCE STATION - BREVARD COUNTY, FLORIDA.
Location	USAF - SKID STRIP AREA DEVELOPMENT PLAN AT CAPE CANAVERAL AFS - BREVARD CO.
Cost	12.200

E. CENTRAL FL RPC - EAST CENTRAL FLORIDA REGIONAL PLANNING COUNCIL

The proposed Department of the Air Force - Draft Final Environmental Assessment for the Skid Strip Area Development Plan at Cape Canaveral, as submitted for review, is consistent with the East Central Florida Regional Planning Council's adopted Strategic Regional Policy Plan's Goals, Objectives, and Policies.

BREVARD -

BREVARD -

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

No Comments Received

STATE - FLORIDA DEPARTMENT OF STATE

No Comment/Consistent

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP's Central District Office in Orlando advises that the development activities proposed for evaluation under the EA may be subject to the following regulatory program requirements: - Industrial Wastewater, per Rule 62-621.300(2), Florida Administrative Code (F.A.C.), for any discharges of produce groundwater, including discharges generated by flushing or pressure testing associated with pipe line, storage tanks, etc. Please contact Mr. Ali Kazi, Engineer, at the Central District Office at (407) 893-3316 for further information. - Potable Water mains or water plant construction to serve the expanded area proposed in this advance notification may require permits from the water purveyor. Please contact Mr. Reggie Phillips, Environmental Manager, at (407) 893-3319. - Air Resources Management staff notes that the demolition of the existing control tower and associated buildings requires asbestos surveys and notification to the DEP prior to the activity. Asbestos abatement is needed if the survey indicates that it meets the applicable National Standard of Hazardous Air Pollutants thresholds and requirements. If the concrete is removed, it should also be tested for asbestos and properly disposed. If it does contain asbestos, it cannot be crushed. Please contact Ms. Caroline Shine, Acting Program Administrator, at (407) 893-3336 for additional information and future coordination.

ST. JOHNS RIVER WMD - ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

CCAFS staff has begun coordination with District staff on this work. Wetland and surface water impacts are expected to be limited to filling or piping of the upland cut ditches. These impacts to upland cut ditches typically do not require mitigation. The proposed improvements to the airfield are expected to require modifications to the surface water management system. It is expected that the project will exceed thresholds and will require an Environmental Resource Permit from SJRWMD. During the permit application review process, the applicant must demonstrate that any direct and secondary impacts to wetlands, and adverse impacts to the wildlife value of wetlands and surface waters, have been avoided or minimized. Unavoidable impacts would require mitigation in accordance with the Unified Mitigation Assessment Method found in Chapter 62-345, F.A.C. Compliance with the environmental review criteria in Chapter 12 of the Applicant's Handbook would also be required. Please note all required ERP permits must be issued prior to any clearing or other construction activities within a project area. Please contact Susan Moor, Supervising Regulatory Scientist, in the Palm Bay Service Center at (321) 676-6626 or smoor@sjrwmd.com if there are any questions.

COUNTY: BREVARD
SCH- USAF- NEPA- CCAFS
2009-03070

DATE: 5/21/2009
COMMENTS DUE DATE: 6/25/2009
CLEARANCE DUE DATE: 7/6/2009
SAI#: FL200905224761C

MESSAGE:

STATE AGENCIES	WATER MNGMT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
ENVIRONMENTAL PROTECTION FISH and WILDLIFE COMMISSION X STATE	ST. JOHNS RIVER WMD		

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

DEPARTMENT OF THE AIR FORCE - DRAFT FINAL ENVIRONMENTAL ASSESSMENT FOR THE SKID STRIP AREA DEVELOPMENT PLAN AT CAPE CANAVERAL AIR FORCE STATION - BREVARD COUNTY, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
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DEP - 3700

EO. 12372/NEPA Federal Consistency

No Comment No Comment/Consistent
 Comment Attached Consistent/Comments Attached
 Not Applicable Inconsistent/Comments Attached
 Not Applicable

From:

Division of Historical Resources

Division/Bureau:

Bureau of Historic Preservation

Reviewer:

S. Edwards

Laura A. Kaemmerer,
Deputy SHPO
6.15.2009

Date: 6-12-09

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